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Assessment of knowledge and practice of blood transfusion among nurses in North West bank hospitals in Palestine

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Thesis Approval

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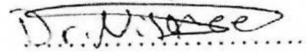
1. Dr. Nisreen Ibrahim Salama: Supervisor	
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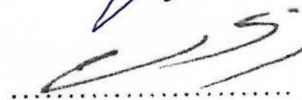
3. Dr. Rebhi Bsharat: External Examiner	

Declaration

I declare that, except where explicit reference is made to the contribution of others, this thesis is substantially my own work and has not been submitted for any other degree at the Arab American University or any other institution.

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Dedication

This thesis is dedicated to:

God, my Creator and Master,

My teacher and great Messenger, Muhammad, peace and blessings be upon him, who taught us the purpose of life,

To my homeland, Palestine, and our righteous martyrs,

To my father and mother for their love and support since childhood, and their endless prayers,

To my brother, who has been my support from childhood until today

To my dear sisters who have supported me and congratulated me on every success,

To my husband, my companion and constant support,

To all my friends and colleagues with whom I have worked in all my workplaces,

To everyone who has supported me in the success of this study.

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In the name of God, the Most Gracious, the Most Merciful. Praise is to God, and peace and blessings be upon the best of His creation, and upon the Seal of the Prophets and Messengers, our Master Muhammad, may God bless him and grant him peace.

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Abstract

Background: Blood transfusion is an essential and common medical procedure that can save lives but may lead to complications if not managed properly. Nurses play a crucial role in the transfusion process, and mistakes frequently occur due to deficiencies in knowledge and practice, particularly in environments without ongoing training. This study aimed to assess the knowledge and practice of blood transfusion among nurses working in hospitals in the North West Bank of Palestine.

Methods: A cross-sectional quantitative descriptive study was performed with 282 nurses employed in medical, surgical, and ICU units in hospitals located in the North West Bank in Palestine. A structured questionnaire, modified from validated instruments, was utilized to evaluate knowledge (10 items) and practice (15 items) using multiple-choice questions. Data were analyzed by using SPSS version 21.

Results: The average knowledge score was 33.09%, while the average practice score was 36.19%, both demonstrating poor levels. Nurses working in ICU departments achieved considerably higher scores than their counterparts in medical and surgical units. A moderate, statistically significant positive relationship existed between knowledge and practice scores ($r = 0.442$, $p < 0.001$).

Discussion: The findings indicate a common lack of knowledge and practice among nurses, especially in non-ICU environments. These findings are consistent with research from other developing settings and indicate a deficiency in standardized training initiatives. The positive relationship between knowledge and practice indicates that boosting education could improve clinical performance.

Conclusion: The research revealed that nurses in hospitals of the North West Bank have deficiencies in knowledge and practice related to blood transfusion, posing risks to patient safety. It emphasizes the immediate requirement for continuous education, training, and regular assessment to enhance transfusion safety and outcomes.

Key words: Knowledge, Practice, Blood Transfusion.

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List of Abbreviations

AABB	Association for the Advancement of Blood & Biotherapies
SHOT	Serious Risk of Transfusion
ABO	A, B, O and AB
BT	Blood Transfusion
CBC	Count Blood Cell
ICU	Intensive Care Unit
MoH	Ministry of Health
NS	Normal Saline
SHOT	Serious Hazards of Blood Transfusion
SPSS	Statistical Package of Social Science
TR	Transfusion Reaction
UNRWA	United Nation Relief Work Agency
V/S	Vital Signs
WHO	World Health Organization

Chapter One
Introduction

1.1 Background

Blood transfusions are defined as the procedure by which one person's blood (a donor) is infused into another's circulation (a recipient) for medical reasons (Vaghar, 2018).

An important aspect of routine clinical practice is the transfusion of blood and blood products, offering lifesaving therapeutic benefits (Bediako et al., 2021). The identification of blood groups at the beginning of the twentieth century, along with advancements in anticoagulation, sterile techniques, and equipment, gave rise to a new branch of science called "transfusion medicine" (Akyol, 2019).

According to Association for the Advancement of Blood & Biotherapies (AABB) In 1628 English physician William Harvey discovers the circulation of blood. Shortly afterward, the earliest known blood transfusion is attempted; in 1665 the first recorded successful blood transfusion occurs in England: Physician Richard Lower keeps dogs alive by transfusion of blood from other dogs (*Association for the Advancement of Blood & Biotherapies, n.d.*)

Across the globe, over 80 million units of blood are donated a year (Malako et al., 2019). Blood is used for replacement in cases of hemorrhage or anemia, platelets for patients undergoing chemotherapy or to stop postoperative bleeding, plasma for clotting factors in patients with hemophilia, and immunoglobulin for passive immunity for individuals at risk of certain infections (Bediako et al., 2021; Shaikh et al., 2023).

Blood transfusions primarily treat the underlying illnesses of recipients and replenish lost blood. While generally considered safe, there is a risk of adverse effects (Shaikh et al., 2023).There are five phases during the administration of a blood transfusion, four of which are linked to nursing performance. These phases include preparation, collection, pre-transfusion actions, and post-transfusion activities (Majeed et al., 2020b). Blood transfusions must be conducted with precautions against potential adverse reactions and infectious diseases that the donor and recipient could contract (Jogi et al., 2021; Shaikh et al., 2023).

Despite increased knowledge about the administration of blood and blood products, complications related to safe blood transfusion are still largely due to human errors. The most frequent causes of errors during the use of blood in clinical practices are incorrect blood group transfusions (inappropriate ABO), inappropriate storage conditions, and unconfirmed patient identity (Akyol, 2019; Ali et al., 2024).

Human errors are a significant source of risks in blood transfusion processes, accounting for approximately 85% of preventable hazards. Acute hemolytic reactions, often caused by ABO incompatibilities, can result in fatalities (Mohd Noor et al., 2021).

Previous research in the Arab world has shown that nurses' knowledge of blood transfusion is somewhat lacking. Healthcare workers' lack of knowledge or expertise may compromise the safety and efficacy of blood transfusions, even with extensive study and reevaluation of policies and procedures (Ali et al., 2024; Rudrappan, 2019).

Because nurses are the final link in the transfusion process chain and because nursing-related tasks dominate the transfusion process, their role is critical to the correct management of transfusion

responses and the achievement of desired results. As a result, nurses need to be competent in the transfusion of blood and blood products (Bediako et al., 2021).

Nurses must receive training immediately to learn about risks associated with blood transfusions, the most recent safety regulations, nurse interventions, and decision-making. It was also underlined how important it is to routinely assess nurses' knowledge and practices (Akyol, 2019).

Political, economic, and infrastructure limitations provide several obstacles for Palestine's health system, which still seeks to provide its people basic medical care (WHO, 2023). Blood transfusion services are an essential part of medical care, particularly for patients who need treatment for chronic conditions like thalassemia, urgent interventions like surgeries, or trauma care (Palestinian Ministry of Health [PMoH], 2022). Physicians and nurses usually work together to implement the blood transfusion policy in Palestinian hospitals. Despite resource constraints, the health system prioritizes patient safety and strives to maintain an adequate and safe blood supply through blood donation campaigns and centralized blood banks. Strict protocols are followed to ensure compatibility testing, safe handling, and prompt response to any adverse reactions (WHO, 2023).

1.2 Problem statement

In contemporary clinical practice, blood transfusion remains a life-saving and widely utilized procedure. Nevertheless, associated errors can result in significant morbidity and mortality. In the West Bank alone, Ministry of Health hospitals administered 34,748 transfusions of blood units and blood products in a recent year (WHO, 2022), underscoring high utilization alongside the critical need for safety. Over 118 million blood units are gathered worldwide each year at a rate of 31.5 units per 1,000 transfusions annually. Populations in high-income nations, 15.9 units for every

1,000 individuals in middle-income. nations and 6.8 units for every 1,000 individuals in low-income nations (WHO, 2020).

Blood transfusion is an essential clinical procedure that can save lives and improve patient outcomes, but its safety and effectiveness depend primarily on the knowledge and practice of healthcare professionals, especially nurses, who are directly involved in the preparation, administration, and monitoring of blood transfusions (Majeed et al., 2020a). Serious concerns regarding patient safety and the potential risk of transfusion-related complications are raised by the observed instances of poor adherence to transfusion protocols, lack of awareness of safety guidelines, and variability in clinical practices among nursing employees in many hospitals across the North West Bank in Palestine. Although established international guidelines govern blood transfusion practices, there is little local evidence evaluating nurses' actual knowledge and compliance in the Palestinian context.

Also, although there are previous studies that examined nurses' knowledge and practices about BT, few studies were conducted in Palestine. Therefore, this study seeks to assess knowledge and practice of BT among nurses in northwest bank hospitals in Palestine.

1.3 Significance of the study

The knowledge and competence of the nurses performing the transfusion process determines its safety and efficacy. Inadequate performance can lead to avoidance issues that may threaten the well-being of patients. The goal of the study is to increase nursing staff members' blood transfusion knowledge and practice so that errors in blood transfusion procedures can be minimized, and to identify any nursing staff weaknesses in the process of administering blood transfusions so that corrective measures can be implemented.

This study is intended to describe the process of administering blood, to assist nursing staff to become proficient healthcare professionals by teaching them how to appropriately provide blood transfusions. Blood transfusion competence is essential for both promoting aseptic practices to stop the spread of infection and providing patients with safe and effective care.

It is the primary duty of nurses to guarantee a safe transfusion of blood. Consequently, it's critical that nurses possess adequate best practice knowledge. In order to guarantee optimal practices, nurses could learn from the study's findings at workshops and in-service training.

The results of the thesis can be put to immediate use in the context of university academic education as well as when a student is gaining clinical experience in a hospital ward. The guide will be helpful in directing the staff members as they assist the student during the blood transfusion procedure. Maintaining an aseptic conditions and patient safety are critical considerations during the procedure.

The instructional movies is intended to provide nurses involved in this routine hospital procedure with a thorough awareness of patient care rules in addition to imparting technical skills. The movie offered a clear explanation of the significance of patient identification, adverse responses, and patient safety during blood transfusion—all of which are crucial steps in the safe transfusion process.

1.4 Aim of the study

The main aim of the study is to assess the knowledge and practice of blood transfusion among nurses in Northwest Bank hospitals in Palestine.

1.4.1 Objectives of the study

1. To assess the level of knowledge towards blood transfusion among nurses in North West bank hospitals in Palestine.

2. To assess the level of practice towards blood transfusion among nurses in North West bank hospitals in Palestine.

1.5 Research Questions

1. What is the level of knowledge towards blood transfusion among nurses in North West bank hospitals in Palestine?

2. What is the level of practice towards blood transfusion among nurses in North West bank hospitals in Palestine?

1.6 Research Hypotheses

Null Hypothesis (H0): There is no significant difference in the knowledge of blood transfusion among nurses in Northwest Bank hospitals in Palestine based on demographic factors (age, sex, religion, etc).

Null Hypothesis (H0): There is no significant difference in the practice of blood transfusion among nurses in Northwest Bank hospitals in Palestine.

1.7 Study variables

The variables measured in this study can be divided into independent and dependent variables. The independent variables of this study were the process of blood transfusion. For the dependent Variables of this study is the level of knowledge of blood transfusion and is the level of Practice of blood transfusion.

1.8 Conceptual Definition

1.8.1 Knowledge

Nurses who score below 50% are regarded as having poor knowledge, those with scores between 50% and 74.9% are seen as having moderate knowledge and individuals scoring 75% or above are recognized as possessing good knowledge (Mohd Noor et al., 2021)

1.8.2 Practice

The average of optimal practice is defined by a cutoff of 75%; therefore, nurses demonstrating satisfactory practice for blood transfusion should achieve a mean score of 75% or above, while those scoring between 50% and 74.9% are viewed as having fair practice, and scores below 50% indicate poor practice (Mohd Noor et al., 2021).

1.8.3 Blood Transfusion

BT begins with the physician's order and continues for several hours post-transfusion. It includes five phases: ordering for transfusion, preparing the patient before blood collection, activities prior

to transfusion, activities during transfusion, and activities after transfusion. Documentation is a crucial component of every phase. Handling any reactions that may arise is included in the process (Majeed et al., 2020a).

1.9 Operational definition

In this study, the dependent variables are the level of knowledge and level of practice of blood transfusion among nurses, will be assessed through a structured questionnaire (was adapted from (Panchawagh et al., 2020), measuring understanding of blood transfusion indications, procedures, and safety protocols.

The independent variables include nurses' demographic characteristics such as age, gender, years of clinical experience, attendance of blood transfusion training courses. These variables are expected to influence the level of knowledge and practice and will be analyzed to identify significant associations.

Chapter Two
Literature Review

2.1 Introduction

This chapter is a review of literature related to nurses' knowledge and practices with blood transfusions. The literature studies included in this review were retrieved from reputable electronic databases such as PubMed, Science Direct, CINAHL, Google Scholar, and Pro Quest, within last five years.

2.2 Background of blood transfusion

Blood has long been associated with beliefs about supernatural capabilities, psychic characters, or susceptibility to experts and wicked forces (Feyisa et al., 2021). Thus, when it came to treatment before the 17th century, many attempts at blood transfusion were closer to fantasy than fact. The seventeenth century saw the first reference to the circulatory system (Nada, 2021).

Scientists have been studying the blood transfusion process since William exposed how the system of circulatory in the body worked in 1660. Initially, this had to do with the introduction of animal blood into human bodies. James Blundell performed the first human-to-human blood transfusion (BT) in 1818 on a patient with postpartum hemorrhage in England (Bowman et al., 2019).

Knowledge of blood components, blood preservation, and blood type has advanced significantly since the early 1900s (Lotterman & Sharma, 2021). Physicians who contribute to the field of transfusion medicine include those with backgrounds in pathology, hematology, pediatrics, laboratory medicine and clinical medicine. Landsteiner's discovery of the rhesus system later in 1939 led to fewer transfusion responses than they had previously been. Thanks to significantly

improved technology and safety, currently, the risk of blood-borne diseases such as HIV and hepatitis is less than one per million transfused unit (Di Minno et al., 2016).

The first surgical blood transfusion was performed in 1906 at Case Western Reserve University in Cleveland. As well as, the British Red Cross launched the world's first blood donation program in 1921. The First World War served as an impetus for the fast growth of many banks of blood and blood transfusion procedures. In 1932, a hospital in Leningrad opened the first bank of blood, and in 1940, the United States government launched a nationwide blood donation program (Fong, 2020).

2.3 Patient's safety

The health sector is under severe pressure; a complex system, there is always the possibility of errors and accidents (World Health Organization, 2019). The patient safety refers to not causing avoidable harm to patients and preventing unnecessary harm to medical personnel (Witczak et al., 2021). It is widely viewed as one of the major hurdles facing healthcare organizations and a critical component of quality healthcare; it significantly affects the provision of health care (World Health Organization, 2020).

Nurses' responsibilities regarding patient safety include monitoring any clinical deterioration in patients, seeing errors, procedures of understanding care, and near misses, recognizing any change in the patient's condition, starting blood transfusions, and stopping blood transfusions (Sullivan, 2015). In addition, nurses check the safety of patients by adhering to regulatory protocols to detect any problems or risks that might endanger the life of patients. As a result, they regularly evaluate patients, check back in, monitor actions, provide assistance, as well as interact with some medical professionals (Vaismoradi et al., 2020).

It has been determined that nurses' knowledge and skill levels have a role in enhancing patient safety and reducing the likelihood of untoward incidents. In order to prevent practice errors, create safer and more sustainable health care systems, and thus reduce the risk of errors, nurses must adhere to patient safety principles. This can be achieved by adhering to safe blood transfusion policies, verifiable performance standards and educational initiatives (Henneman et al., 2017).

2.4 The knowledge towards blood transfusion among nurses

Knowledge is a cornerstone that motivates nurses' activities because it enables them to give meaning to a variety of phenomena they encounter daily. Knowledge gaps, then, are a major factor contributing to transfusion errors and leading to suboptimal performance (Kipkulei et al., 2019). Blood transfusion is a critical component of nursing practice as the nurse's knowledge and skills play a key role in this cascade (Talati et al., 2016).

According to (Majeed et al., 2020b) nurses must possess a comprehensive awareness of the blood transfusion, outstanding skills of communication, and the capability to deal with a wide range of individuals. Research has shown that BT problems can be largely prevented and controlled when individuals have the necessary information and skills (Roudsari et al., 2021). Unfortunately, current research has revealed that nurses in several different countries lack sufficient information about the blood transfusion process (Hijji et al., 2013; Rudrappan, 2019).

Most nurses did not know much about basic Rh and ABO compatibility. Therefore, the issue was painted in the Serious Risk of Transfusion (SHOT) study, where the initial proposal was for clinical staff involved in blood transfusion to receive training in the principles of ABO and D blood groups (Bolton-Maggs, 2019).

Even with today's increased knowledge about the blood products and administration of blood, human error remains the primary cause of many problems associated with safe blood transfusion practices (Akyol, 2019). According to(Sarı & Altuntaş, 2007), the most common reasons for errors occurring during blood use in clinical settings include inappropriate storage conditions, wrong type of blood transfusions (unsuitable ABO), and unclear identity of patient.

Research emphasizes the need for nurses to be adequately knowledgeable about safe transfusion techniques, clinical procedures, and blood transfusion (Hijji et al., 2012). A few studies have found that nurses lack experience and understanding about safe transfusion practices at each stage (Encan & Akin, 2019; Yami et al., 2021) . In other research (Hurrell, 2014; Mohd Noor et al., 2021), the majority of nurses answered questions related to blood transfusion safety correctly. (Talati et al., 2016) found that less than half of nurses answered questions about blood transfusions and components of blood correctly.

Knowledge is an important factor affecting all stages of blood transfusion practice. Thus, a variety of factors, including extrinsic and socio-demographic characteristics, influence both a nurse's knowledge and practice. Moreover, these variables may increase the likelihood of a knowledge gap, which might result in subpar performance (Encan & Akin, 2019).

2.5 The practice towards blood transfusion among nurses

Good practice is a critical component of safe and successful blood transfusions; it helps make informed decisions about blood use based on laboratory and clinical evidence, ensures that the right blood product is given to the right patient at the right time, and monitors and treats patients Possible transfusion-related side effects (when they occur) documentation (Kipkulei & Lotodo, 2019). As a result, nurses must also be aware of their indications, consider any patient concerns

about the transfusion process, and be able to recognize any adverse consequences (Nunes da Silva et al., 2017).

Incidentally, an observational research's were conducted in Nepal were observed in different wards of the hospital, namely, medical, gynecology and obstetrics, postoperative, surgical, high dependency unit (HDU), orthopedic ward, and the intensive care unit (ICU), revealed that only 16.5% of participants checked intravenous cannula permeability by flushing with 0.9% normal saline (NS) before starting a blood transfusion and that only 43.5% of healthcare participants used gloves during the procedure, 95% of cases have the paperwork completed. These findings suggest that the absence of a quality culture, order and administration in the field procedures of blood transfusion may be related to a significant gap in knowledge and practice among healthcare staff (Sapkota et al., 2018).

Another recent observational descriptive research conducted by (Majeed et al., 2020b), evaluated 200 randomly recruited nurses from different wards to determine their practices regarding blood transfusion. The results showed that less than 50% of nurses followed the correct procedures before receiving bags of blood from banks of blood before initiating a transfusion, more than 50% of nurses' demonstrated appropriate practices, and less than half of the nurses continued to use correct practices after initiating a transfusion.

(Reis et al., 2016) conducted a descriptive study using a quantitative technique to monitor the blood transfusion procedure at a public hospital. Information was gathered on the overall duration of blood transfusions, monitoring vital signs, and blood reactivity. 53.4% of the 1012 subjects that underwent examination engaged in improper behavior. 6% of participants begin blood transfusions after 30 minutes after being sent from the blood bank and 9.3% of participants do not monitor vital

signs. The study found that in order to ensure that blood transfusion forms are filled correctly and consistently, strategies must be developed.

In conclusion, previous research from a variety of countries has shown that nurses in particular, and other healthcare workers, lack experience and understanding of the risks and processes associated with blood transfusion. This suggests that there may be a chance of inappropriate blood transfusions being performed in clinical settings.

2.6 Blood transfusion administration and Decision to transfuse blood product

The five interrelated stages of transfusion management are preparation before collecting blood units from the storage site, pre-transfusion activities, post-transfusion activities, and post-transfusion patient monitoring (Bradbury & Cruickshank, 2000). Four of them are directly related to the nursing role. As a result, it is crucial for the nurse to understand basic transfusion techniques and be confident in their application (Lee et al., 2016).

2.6.1 Preparing the patient before blood collection by nurses: It is necessary to assess and ensure the readiness of patient for blood transfusion; the patients need to mentally and fully prepare for therapy of blood. Clear physician orders, easy access to an IV, a permission consent, and administration of any necessary prior medications or other treatments are all part of patient preparation procedures (Lee et al., 2016).

Numerous other studies have shown this, with the majority of the sample possessing sufficient information regarding patient preparation prior to getting a blood transfusion. These preparations included monitoring venous access line patency, documenting baseline vital signs, educating the patient, refraining from obtaining blood from the bank before administering any prior prescribed

medication, understanding what to do if the nurse receives an imperfect order, and ensuring that consent has completed (Bediako et al., 2021). Unfortunately, many nurses are not well-versed in the importance and techniques of confirming patient identity, as well as preparing the patient before collecting blood bags (Elhy & Kasemy, 2017).

2.6.2 Blood bag collection: Strict adherence to patient identification is essential for safe blood transfusion at every link in the transfusion chain, but especially when obtaining products from a blood bank (Frietsch et al., 2017). Accurate patient identification and collection of a matched sample are critical steps in the safe distribution of blood products to patients. According to (Hoffmeister & Moura, 2015) the first line of defense against incorrect blood transfusion is to ensure that the patient is properly identified and blood is drawn from the appropriate site.

The patient's bed number or room number is not comprised in the list of identifiers that must be considered for accurate patient identification (Kavaklioglu et al., 2017). A quantitative, descriptive research conducted by (Hoffmeister & Moura, 2015) revealed that in particular cases, the patients were misidentified due to a coincidence of name, surname, or date of birth, it is disastrous and can lead to serious errors if the patients receiving blood are not identified. These errors carry a significant risk to the patient's life, which may lead to disability and necessitate further medical care, longer hospital stays, morbidity, or even death (Najafpour et al., 2017).

A cross-sectional study conducted by (Mohd Noor et al., 2021) with 200 registered nurses involved in blood transfusion procedures at Hospital Universiti Sains Malaysia, revealed since labeling specimens involves significant risks, nurses assigned to take blood samples must ensure accurate patient identification at the patient's bedside and through asking the patient to provide their full name or by checking their wristband. Even in cases where patients were unconscious, nurses had

to quickly and correctly scan the patient identification strip and label the sample at the patient's bedside; details were compared to the patient's record.

A descriptive observational study conducted by (Sapkota et al., 2018) with an aim to assess the blood transfusion practice among healthcare personnel, highlighted the significance of verifying patients' identity: blood draw, blood product collection, and blood unit administration. Emphasize that Patients should give their full name, which should match the all information on the strip of identification, label of blood bag, and patient documentation, and identity must be verified verbally and physically by looking at the identification strip .After the doctor writes the blood order, blood samples are collected before the transfusion to test compatibility and blood type. Compatibility testing is required to prevent transfusion reactions that may lead to blood transfusion-related morbidity or death.

Furthermore, it is important to accurately confirm the type blood of recipient and that he or she receives safe blood products. Some previous research revealed that most nurses were not skilled in the basic ABO and Rhesus blood group systems, and most of them could not determine the appropriate blood group (Lee et al., 2016).

In addition, blood bank staff must document the time and date of blood donation as well as the identity of the donor and blood collector. Before removing blood components from the blood bank, the person collecting the blood should also check the patient and blood bag details before taking the blood components from the blood bank (Kotzé et al., 2015). The nurse should check the blood bag carefully; Return the unit if there is a discrepancy. When given a unit of blood, the majority of nurses do not complete blood bank inspections. Thus, there is an urgent need for training to avoid errors that may endanger patients' lives (Kavaklioglu et al., 2017).

2.6.3 Activities pre start of blood transfusion by nurses: Nurses need to prepare patients for transfusion therapy before starting a transfusion. In order to benefit from therapy, the patient needs to be well-informed and psychologically ready (Hurrell, 2014). So, to prevent any delay that could affect the quality of blood products, nurses must make sure that patent intravenous access is available and obtain baseline vitals (blood pressure, temperature, pulse, and respiratory rate) before obtaining blood units from the storage site(Lee et al., 2016; Sapkota et al., 2018). Blood transfusions must stop and blood units must be stored at the storage site if the patient is medically unsuitable to receive blood.

According to (Lee et al., 2016) revealed that transfusions must begin as soon as the blood unit arrives at the ward or, at most, 30 minutes after the blood unit is taken out of controlled temperature storage. Even in situations where the patient is unconscious, actively bleeding, receiving transfusions after hours, or the nurses are familiar with the patient; a last blood check must always be performed at the patient's bedside. Nursing staff is required to promptly notify the blood bank in the event that there is a disagreement between the patient's identifying wristband, blood request form, and blood unit labels. Transfusions cannot begin until the disagreement has been resolved.

According to (Bediako et al., 2021), a descriptive cross-sectional study aimed to assess the knowledge and practices of blood transfusion safety among nurses at Komfo Anokye Teaching Hospital showed blood warming is the process of warming blood units, particularly whole blood or packed red blood cells, to a temperature that is more similar to the bodies before being transfused to a patient. Routine blood transfusion procedures do not involve the warming of blood; it is only advised for newborn transfusions, and large-volume fast transfusions. 36–46% of registered nurses and midwives in this study were aware of the appropriate circumstances in which blood warming is required. Therefore, most of us (54–64%) would warm blood in inappropriate conditions, and

16% would warm blood in all conditions. This result is consistent with a study by (Khetan et al., 2018) that found that 95% of participants warmed blood under the incorrect conditions.

During transfusion, Saline is the only solution that can be infused with blood products(Lee et al., 2016). According to (Wood et al., 2019) normal saline is typically used to maintain IV access until the next blood unit is transfusion and to increase the flow rate of packed red blood cells. The quality of blood products may be impacted by administering other solutions or drugs through the same giving set. For instance, fluids containing calcium, such Ringer's lactate, will chelate the anticoagulant citrate, reducing its effectiveness and resulting in the formation of blood clots (Norfolk & Hartley, 2014). Red blood cells will hemolysis in a hypotonic solution, such as 5% dextrose (Norfolk & Hartley, 2014). Moreover, it can be challenging to determine whether the patient's unfavorable reaction is due to the blood unit or the drug (Shah et al., 2015). Only before or after the transfusion should medications be administered .Two distinct intravenous access points should be used for each product if simultaneous delivery is considered required (Norfolk & Hartley, 2014).

2.6.4 Nursing activities after blood transfusion: Nursing duties after starting a blood transfusion include determining the proper transfusion flow rate, recording all relevant information, including evaluation results, and continuing to monitor for transfusion responses (Bediako et al., 2021).

Patient must be monitored from time to time for any undesired event. After initiating transfusion, nursing staffs must closely observe the patient for the first 5 - 10 minutes, as stated in the local policies (Bediako et al., 2021). Serious Hazards of Transfusion (SHOT) reported that more than 60 percent of transfusion reactions happened at the first 30 minutes of transfusion (Shah et al., 2015).

It is crucial that nurses have adequate training to identify various transfusion reactions. According to(Yami et al., 2021), common acute symptoms include fever with a temperature increase of more than 1°C, urticaria, tachycardia, hypotension or hypertension, dyspnea, anxiety, and pain (at the infusion site, back, or chest). The first thing to do is to halt the transfusion and flush the intravenous access with 0.9% saline as soon as these symptoms are identified during the transfusion episode (McClelland, 2002). Following that, nurses must alert treating physicians and any other close medical professionals to the patient's need for immediate attention and to begin any necessary resuscitation procedures (Norfolk & Hartley, 2014).

When a transfusion ends without causing any negative side effects, nurses need to record the final vital sign check and note it. They also need to record the total volume transfused, the time it concluded, and the proper completion of the blood tag that is attached (McClelland, 2002). Patients must be briefed to watch out for acute or delayed transfusion reactions that occur within or after 24-hours post-transfusion (Hurrell, 2014).

Chapter Three

Methodology

3.1 Introduction

This Chapter gives an overview of the research methods, study design, study setting of the study, study population and sampling process, period of the study, inclusion and exclusion criteria, study tools, ethical consideration, pilot study, data collection, and data analysis.

3.2 Study Design

This study utilized a quantitative descriptive cross-sectional design to assess the knowledge and practice of blood transfusion among nurses in Northwest Bank hospitals in Palestine. A descriptive design employed for describing a phenomenon's traits, frequency, intensity, or entire nature. A cross sectional was chosen because it is appropriate for describing the status of phenomena or for describing relationships among phenomena at a fixed point in time (Polit & Beck, 2010).

3.3 Study Setting

According to Palestinian MOH 2023, the number of hospitals in Palestine is 93 hospitals, and 58 of them located in west bank. This study was covered the north of the Palestine, and the target population was all nurses who work in the Medical , Surgical and ICU departments of governmental hospitals, as seen in table 1

Table 1: Distribution of Medical, Surgical and ICU nurses department in North West bank

Region	Hospital	Number of Medical nurses	Number of surgical nurses	Number of ICU nurses
Tulkarm	Al-Israa Specialized Hospital	8	9	14
	Thabet Thabet Governmental Hospital	37	40	18
Qalqilia	Dr. Darwish Nazzal governmental hospital	30	28	17
	Unrwa Hospital	15	14	12
Jenin	Dr Khalil Suliman Governmental hospital	32	24	14
	Ibn Sina Specialized Hospital	22	15	13
Tubas	Tubas Turkish hospital	12	14	12
Nablus	Rafidia Governmental Hospital	-	25	17
	Al-Watani hospital	20	-	15
	Arab Specialized Hospital	19	21	16
	An-Najah National University Hospital	21	29	37
Total	11	216	219	185
		620		

3.4 Study Period

The study was conducted at 2024-2025, after the acceptance of the proposal, ethical approval and other administrative procedures were obtained. In July 2024, pilot study was conducted then data were collected until the end of November.

3.5 Population and sampling

This study included all the accessible nurses who work in medical/surgical, and ICU wards of targeted hospitals and agree to participate was included in the study.

Non-probability convenient sampling was used to obtain the desired number of nurses.

"According to the nursing department in the Palestinian Ministry of Health, the total number of nurses who work in governmental and private hospitals in the North West bank 620. The sample size was estimated using the Raosoft program with a confidence level of 95%, a margin of error of 5%, and a response rate of 50%. A total sample of 238 participants were needed to conduct this study (appendix 1)

3.6 Eligibility criteria

3.6.1 Inclusion criteria

1. Registered nurses working in ICU, surgical and medical wards.
2. Nurses who were willing to participate in this study.
3. Nurses who have at least one year of work experience.

3.6.2 Exclusion criteria:

1. Nurses who are not in direct clinical care with patients such as nurse managers and public health nurses.
2. Nurses who were not willing to participate in this study.

3.7 Data collection tool

The data collected from the nurses in the targeted hospitals. The questionnaire used in this study was adapted from (Panchawagh et al., 2020). The instrument consists of 2 parts of 25 multiple choice questions, part 1 about demographic data, part 2 about knowledge and practice of blood transfusion.

The demographic data in part 1 consist of 4 different questions which were gender, place of work, experience and training program. For part 2, it consists of 25 questions, first 10 questions about knowledge regarding blood transfusion, and remaining 15 questions about practice regarding blood transfusion. The type of questions used here was multiple choices.

3.8 Validity

The validity of an instrument "relates to its capability to collect the data it is designed to collect (Nieswiadomy & Bailey, 2017). The greater the validity of the instrument, the more the researcher is assured that it will address the research inquiries. The validity of the instrument can be evaluated from four dimensions: face, content, construct and criterion (Nieswiadomy & Bailey, 2017)

3.8.1 Face and content validity

Face validity is established when a preliminary review of the tool shows that it is an appropriate means to gather the necessary data, meaning it assesses what it is intended to measure (Nieswiadomy & Bailey, 2017). The aim of content validation is to evaluate the relevance of each question domain, the significance of each specific item, and to ascertain if the question contents align with the intended purpose and overall objective, while also ensuring statistical reliability and the capability to analyze data effectively (Nieswiadomy & Bailey, 2017).

In this study, the researcher sent the Questionnaire, as well as the study objectives, to three different academic and senior nurses to validate the content of the instrument, their evaluations focused mainly on the relevance and coverage of the items. Most of the feedback was related to wording and translation issues rather than the content itself. Based on their reviews, minor modifications were applied. It worth to mention that the original instrument was in the form of multiple-choice questions.

3.10 Pilot Study

According to (Creswell, 2018) a pilot study refers to a method used to examine the design/methods of instrumentation prior to the actual research. This method contains initial testing of data collection instruments and processes to identify and rectify errors (Kangu, 2017). In other words, the pilot study aims to obtain feedback from the respondent on the clarity and conciseness of the questionnaire items and contents.

The piloting was carried out on 20 participants who met inclusion criteria selected after the ethical approval got from Arab American University and the MoH and prior to proceeding with the actual study. The purpose of pilot study was to assess the feasibility, delivery procedure, clarity, readability and scale comprehension, and the time needed to finish the questionnaires. The participants indicated that they had no trouble in interpreting or clarifying the contents of the instruments. The pilot study found that the average time taken to complete the questionnaire 10 to 15 minutes on average. Regarding the sample of participants in this pilot study, the reliability of the internal consistency (Cronbach's alpha) is high and amounts to 0.81 for the whole scale.

3.9 Data collection process

After obtaining approval from the Arab American University Palestine and Palestinian Ministry of health (MOH). The researcher initially reached out to the nursing department leaders in the selected hospitals to clarify the study's objective and secure their assistance in distributing the survey. In collaboration with them, current professional WhatsApp groups for nursing personnel were used, and in certain instances, new groups were established specifically for the research. The survey link, generated through Google Forms, was distributed among these groups with a short introductory message outlining the study goals, ensuring respondents of the confidentiality of their answers, and delivering straightforward instructions on how to fill out the questionnaire. Respondents were told that the survey would require around 5–10 minutes to finish. Periodic reminder messages were dispatched to motivate participation and guarantee representation from every shift and department. Once the data collection period ended, the Google Forms link was disabled, and the responses were transferred into an Excel file for later statistical analysis.

3.11 Ethical Consideration

Ethical approval was obtained from Arab American University and the Palestinian Ministry of Health. A consent form was provided to every participant prior to the study. Voluntary participation was explained (The participant has the right to withdraw from the study at any time he wishes without any consequences). It was explained that all data would be kept confidential and would be used for study purposes only. A clear explanation was given to each participant about the study objectives and tool; enough time was given for questions.

3.12 Statistical analysis

“Statistical analysis was performed using Statistical Package for Social Sciences (SPSS version 21). Mean ± standard deviation was computed for continuous data. Frequencies and percentages were calculated for categorical variables. Moreover, t-test and one-way ANOVA, Pearson correlation were used. A p-value of less than 0.05 was considered to be statistically significant for analyses”.

Chapter Four

Results

This chapter reviews the descriptive and analytical results of the current study, where the descriptive results showed the frequencies and percentages of nurses' demographic variables and their responses to questions of knowledge and practice towards blood transfusion, in addition to the description of total scores of knowledge and practice in terms of their overall scores and classifications. The analytical results showed the investigation of the relationship between nurses' demographic factors and both scores and classifications of knowledge and practice, as well as the correlation between knowledge and practice scores, using the suitable tests, including Mann-Whitney U test and Kruskal-Wallis for the differences of scores mean ranks across the dichotomous and non-dichotomous demographic factors, respectively, while Chi-Square test was used to test the differences of knowledge and practice classifications across the variables, and Spearman Correlation test was used to test the significance and direction of knowledge and attitude correlation, with a p-value cut point of 0.05 to consider such relationships to be significant.

Part 1: Demographic data

The study sample consisted of 282 nurses, with more male (53.2%) than female nurses (46.8%), while around half of them (47.9%) had an experience in nursing between 1 and 5 years, compared to less than one third of them (30.9%) with less the one year of experience. Moreover, around two thirds of the sample worked in medical (33.0%) or surgical wards (37.2%), compared to equal percentages of nurses working in the ICUs and other departments (14.9% each). Lastly, around three fourths of the nurses (74.8%) reported not receiving a previous training on blood

transfusion or products. The distribution of nurses' demographic data is shown in Table 2 and Figures 1 – 4 below.

Table 2: Distribution of nurses' demographic data

Variables	**Values**	**Frequency**	**Percentage**
Gender	Male	150	53.2%
	Female	132	46.8%
Nursing experience	< 1 year	87	30.9%
	1 – 5 years	135	47.9%
	> 5 years	60	21.3%
Place of work	Medical ward	93	33.0%
	Surgical ward	105	37.2%
	ICU	42	14.9%
	Others	42	14.9%
Received a training about blood transfusion or products	Yes	71	25.2%
	No	211	74.8%

ICU = Intensive care unit

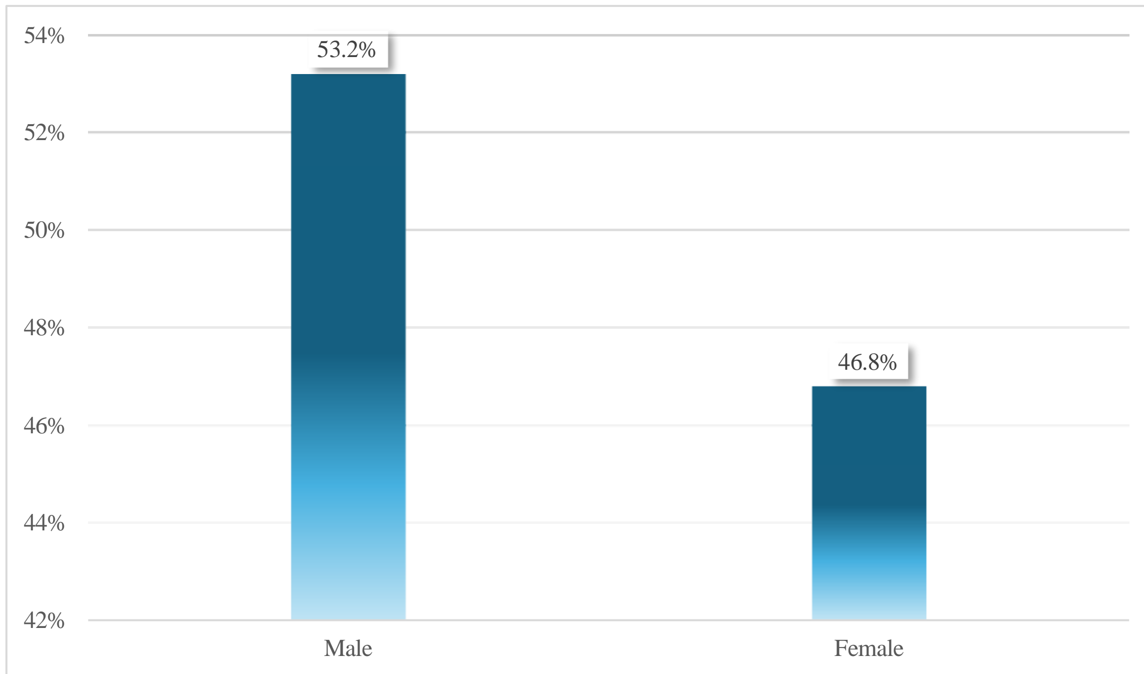


Figure 1: Distribution of nurses' gender

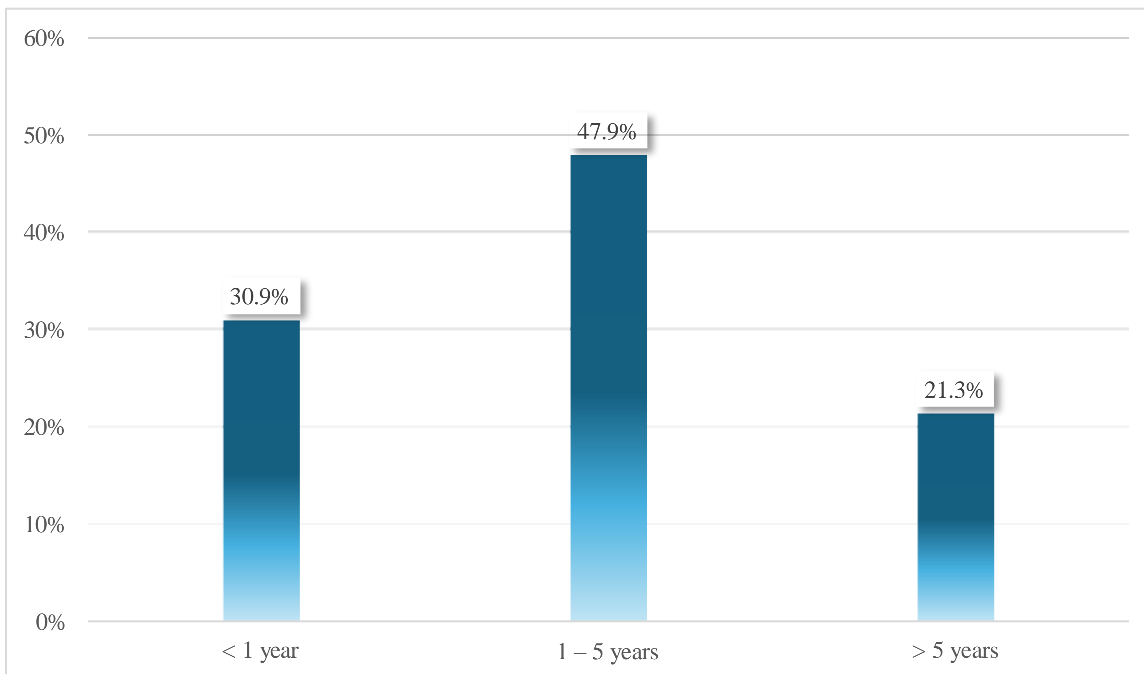


Figure 2: Distribution of nurses' experience

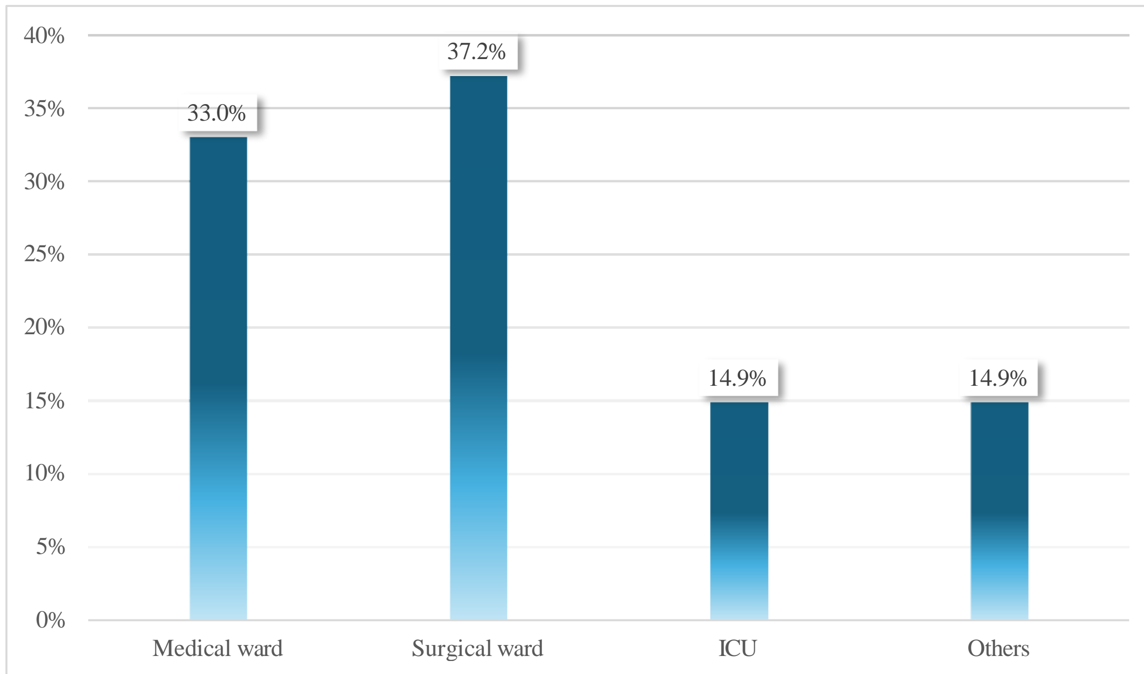


Figure 3: Distribution of nurses' place of work

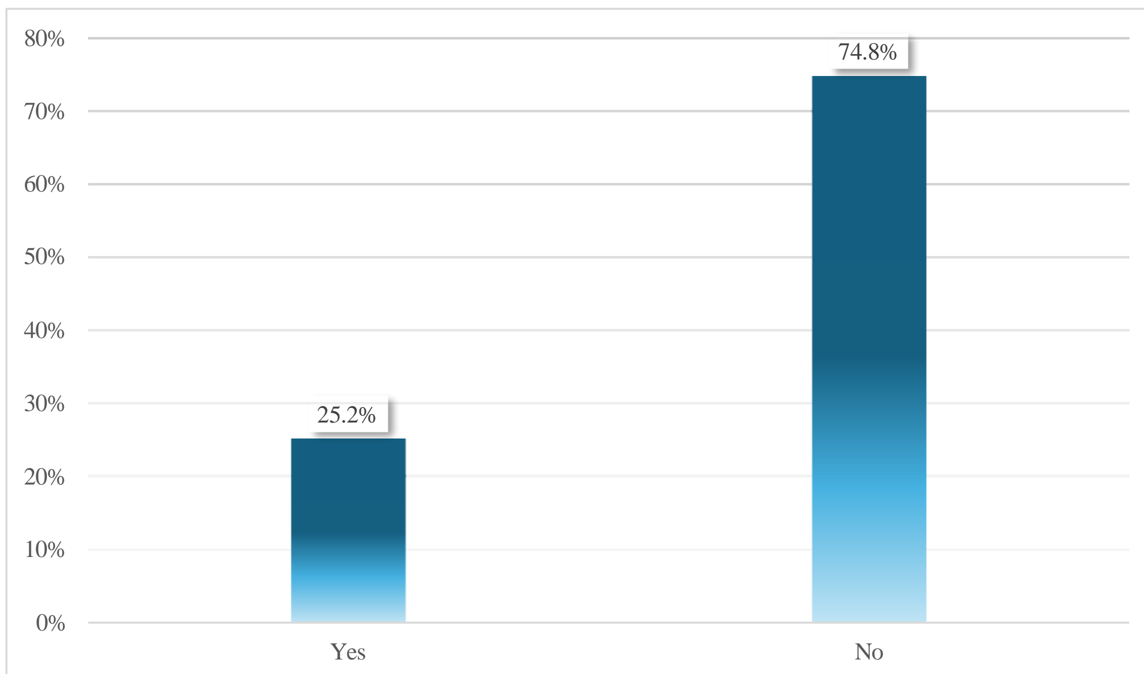


Figure 4: Distribution of receiving training about blood transfusion and products

Part 2: Level of knowledge about blood transfusion

The level of knowledge about blood transfusion and product among the nurses was assessed using multiple-choice form, where the nurses were asked to answer 10 questions with one correct answer, as shown in Table 2. The table shows that the percentage of correct answers ranged between 22.0% and 67.0% for each question. In more details, 67.0% of the nurses correctly answered that O -ve is the universal donor blood group, while 38.7% of them correctly answered that the person can donate blood every 3 months. Moreover, only more than one third of the nurses (36.7%) correctly answered that RBCs can be stored for 35 days after collection, while only one third of the nurses correctly answered that the proper temperature to store RBCs in the blood bank is between 2 and 6 Celsius degrees.

The percentages of correct answers for some questions were less than a third. For example, only 27.7% of the nurses correctly answered that all of the provided options are true regarding instructions given to patients before starting blood transfusion, which included reporting reactions, relative being presents and reporting urine color. Moreover, only 23.8% of the nurses correctly answered that all of the provided diseases can be transmitted through blood transfusion, including HIV, hepatitis and syphilis. Around one fifth of the nurses (22.0%) correctly answered that all of the provided answers are true regarding what should be checked before starting blood transfusion, including blood group compatibility, expiry date and function of IV cannula. Almost one fourth of the nurses correctly answered that mismatched blood transfusion is the most common cause of blood transfusion reactions, while 28.4% of them correctly answered that all of the provided options are precautions that should be taken before starting blood transfusion, such as wearing gloves and protective gown, and hand washing. Lastly, only 28.2% of the nurses correctly chose

vitals to monitor during blood transfusion. Nurses' responses to questions related to knowledge about blood transfusion is shown in Table 3

Table 3: Nurses' responses to questions related to knowledge about blood transfusion

Question/answers	Frequency	Percentage
Q1: Which blood group is the universal donor?		
A. AB +ve	23	8.2%
B. AB –ve	58	20.6%
C. O –ve	**189**	**67.0%**
D. A +ve	11	3.9%
E. Don't know	1	0.4%
Q2: How often can a person donate blood?		
A. Every 1 month	28	9.9%
B. Every 2 months	95	33.7%
C. Every 3 months	**109**	**38.7%**
D. Only once	33	11.7%
E. Don't know	17	6.0%
Q3: How long can the RBC's be stored (shelf life) after collection?		
A. 3 weeks	29	10.4%
B. 35 days	**102**	**36.7%**
C. 35 hours	70	25.2%
D. 4 weeks	49	17.6%
E. Don't know	28	10.1%
Q4: At what temperature are the RBC's stored in the blood bank?		
A. 0 to 4 ºC	38	13.5%
B. 2 to 6 ºC	**94**	**33.3%**
C. -2 to -6 ºC	84	29.8%
D. Room temperature	21	7.4%
E. Don't know	45	16.0%
Q5: What are the instructions given to the patient before starting blood transfusion?		
A. Report any reaction to the nurse	65	23.0%
B. Relative should be present	60	21.3%
C. Report any unusual color of urine to the nurse	59	20.9%
D. All of the above	**78**	**27.7%**
E. Don't know	20	7.1%
Q6: What diseases can be transmitted through blood transfusion?		
A. HIV	89	31.6%
B. Hepatitis	44	15.6%
C. Syphilis	72	25.5%
D. All of the above	**67**	**23.8%**
E. Don't know	10	3.5%
Q7: What will you check before starting blood transfusion?		

A. Blood group compatibility	68	24.1%
B. Expiry date	101	35.8%
C. IV cannula flushed and working well	44	15.6%
D. All of the above	**62**	**22.0%**
E. Don't know	7	2.5%
Q8: Which is the most common cause of blood transfusion reactions?		
A. Mismatched blood transfusion	**73**	**25.9%**
B. Vomiting	80	28.4%
C. Mixture with fluids	86	30.5%
D. Diarrhea	29	10.3%
E. Don't know	14	5.0%
Q9: What precautions will you take for yourself before starting transfusion?		
A. Wear gloves	52	18.4%
B. Wear protective gown	87	30.9%
C. Wash hands	58	20.6%
D. All of the above	**80**	**28.4%**
E. Don't know	5	1.8%
Q10: What will you monitor during blood transfusion?		
A. Vitals	**79**	**28.2%**
B. Pupillary size	103	36.8%
C. Consciousness level	65	23.2%
D. Tremors	24	8.6%
E. Don't know	9	3.2%

Correct answers are bold, HIV = Human Immunocompromised Virus, IV = Intravenous

Part 3: Practice towards blood transfusion

Nurses' practice towards blood transfusion and products was also assessed using multiple-choice questions with one correct answer for each question, as shown in Table 3, which concludes that the percentage of correct answers ranged between 7.8% and 88.6%. In more details, only 22.0% of the nurses correctly answered that monitoring of the patient during blood transfusion is every 15 minutes, while more than one third of them (33.5%) correctly chose "Yes" for the question related to the patient being within the nurse's eyesight during blood transfusion. In addition, 38.4% of the nurses correctly answered about the period of time from the issue to starting blood transfusion, which was up to 4 hours, while 34.3% of the nurses correctly answered that blood should not be refrigerated after being issued if an administration delay happened. A higher

percentage (37.1%) of nurses correctly answered that blood should be transfused slowly for the first 15 minutes, then as needed.

Also, 38.9% of the nurses correctly answered that blood should be irradiated before being transfused to patients on chemotherapy, while only 23.9% of the nurses correctly answered that blood can be transfused to patients with HIV. A higher percentage of nurses (37.7%) correctly answered that stopping the transfusion and calling the doctor is the proper action if signs of fever and chills are noticed on the patient during transfusion, while only 21.0% of them correctly chose the same action for a case when specific signs are noticed after 2 hours of blood transfusion of properly matched blood. Almost one fourth of the nurses (26.1%) correctly chose all the answers related to causes of human errors, including mental exhaustion, incorrect labeling and not checking before administration, while more than half of the nurses (61.8%) correctly answered that informed consent is needed before blood transfusion.

Less than one third of the nurses (30.2%) correctly answered that cross-matching is the final step of ensuring ABO compatibility, while 44.3% of the nurses correctly answered that returning blood is the proper action if the appearance of the received blood seemed cloudy/foamy. Lastly, majority of the nurses (88.6%) correctly answered that there is a need for repetitive education on blood transfusion, while only 7.8% of the nurses correctly chose paracetamol for a specific case study with some signs during blood transfusion. Nurses’ responses to questions related to practice towards blood transfusion is shown in Table 4.

Table 4: Nurses' responses to questions related to practice towards blood transfusion

Question/answers	Frequency	Percentage
Q1: How often do you monitor the patient?		
A. Every 15 minutes	**62**	**22.0%**
B. Every 30 minutes	107	37.9%
C. Every 1 hour	67	23.8%
D. Constantly	40	14.2%
E. Don't know	6	2.1%
Q2: During blood transfusion should the patient be within your eyesight at all times?		
A. Yes	**94**	**33.5%**
B. No	71	25.3%
C. Maybe	79	28.1%
D. Never	28	10.0%
E. Don't know	9	3.2%
Q3: How soon should the blood be given to the patient after issue?		
A. Less than 1 hour	80	28.5%
B. Up to 4 hours	**108**	**38.4%**
C. Up to 8 hours	47	16.7%
D. Up to 6 hours	33	11.7%
E. Don't know	13	4.6%
Q4: Can you refrigerate the blood bag again after it is issued, if there is a delay in administration?		
A. Yes	93	33.2%
B. No	**96**	**34.3%**
C. Sometimes	66	23.6%
D. Only in summer	9	3.2%
E. Don't know	16	5.7%
Q5: How fast can you transfuse blood to the patient?		
A. Slow for first 15 minutes, as needed afterwards	**104**	**37.1%**
B. Any rate for first 15 minutes, slow afterwards	101	36.1%
C. Any rate throughout	55	19.6%
D. Depends on thirst of patient	7	2.5%
E. Don't know	13	4.6%
Q6: How is the blood treated before transfusing to patients on chemotherapy?		
A. Sterilization in autoclave	86	30.7%
B. Irradiation	**109**	**38.9%**
C. Filtering RBCs	62	22.1%
D. Filtering platelets	23	8.2%
Q7: Can we transfuse blood to HIV positive patients?		
A. Yes	**67**	**23.9%**
B. No	87	31.1%
C. Sometimes	94	33.6%
D. Never	20	7.1%

E. Don't know	12	4.3%
Q8: What will you do if the patient shows signs of fever and chills?		
A. Transfuse faster	28	10.0%
B. Give antipyretics	100	35.6%
C. Stop the transfusion and call the doctor	**106**	**37.7%**
D. Ask relative to monitor while continuing transfusion	27	9.6%
E. Don't know	20	7.1%
Q9: You notice that 2 hours after starting transfusion of properly matched blood, the patient starts having tachycardia, hypotension and dyspnea. What is the first thing you will do?		
A. Transfuse faster	53	18.9%
B. Intubate and ventilate	72	25.6%
C. Call a cardiologist	66	23.5%
D. Stop the transfusion and call the doctor	**59**	**21.0%**
E. Don't know	31	11.0%
Q10: Human error is the commonest cause of mismatched blood transfusion. What can be the most probable reason?		
A. Mental exhaustion of the nurse	44	15.7%
B. Incorrect labeling	81	28.9%
C. Not checking blood before administering	60	21.4%
D. All of the above	**73**	**26.1%**
E. Don't know	22	7.9%
Q11: Is there a need for informed consent before blood transfusion?		
A. Yes	**173**	**61.8%**
B. No	74	26.4%
C. Don't know	33	11.8%
Q12: What is the final step to ensure ABO compatibility?		
A. Check the label	83	29.5%
B. Ask the patient	79	28.1%
C. Cross-matching	**85**	**30.2%**
D. Confirm with the relative	27	9.6%
E. Don't know	7	2.5%
Q13: If there was a cloudy/foamy appearance in the blood bag, what should you do?		
A. Transfuse the blood	40	14.3%
B. Return the blood	**124**	**44.3%**
C. Use it with a plain IV set anyway	57	20.4%
D. Destroy the blood	47	16.8%
E. Don't know	12	4.3%
Q14: Do you think there is a need for repetitive education on blood transfusion, blood, and blood products?		
A. Yes	**249**	**88.6%**
B. No	20	7.1%
C. Don't know	12	4.3%
Q15: About an hour after beginning properly matched blood transfusion, you observe that the patient shows signs of itching and rashes. This patient has no fever, has tachycardia, blood pressure is normal, and has normal colored urine. How will you treat this patient?		

A. Steroids	35	12.5%
B. Diuretics	34	12.1%
C. Paracetamol	**22**	**7.8%**
D. None of the above	23	8.2%
E. Don't know	167	59.4%

Correct answers are in bold, RBCs = Red Blood Cells, IV = Intravenous

Part 4: Description of knowledge and practice about blood transfusion

The scores of knowledge and practice regarding blood transfusion were calculated by summing the number of correct answers for each nurse and then convert the score to 100%.For the knowledge scores, the mean knowledge was 33.09 ± 21.28, with a median of 30 (IQR = 20), ranging from 0 to 100, which reflects an overall poor level of knowledge among the participating nurses. In addition, the mean practice score was 36.19 ± 17.21, with a median of 33.33 (IQR = 20), ranging from 6.67 to 93.33), which indicates and overall poor practices of blood transfusion among the participating nurses. The description of overall knowledge and practice scores is illustrated in Figure 5.

Table 5: Description of knowledge and practice scores

Domain	**Mean**	**SD**	**Median**	**IQR**	**Minimum**	**Maximum**
Knowledge	33.09	21.28	30.00	20.00	0.00	100.00
Practice	36.19	17.21	33.33	20.00	6.67	93.33

Scores are not normally distributed; both means and medians were shown. SD = Standard deviation, IQR = Interquartile range

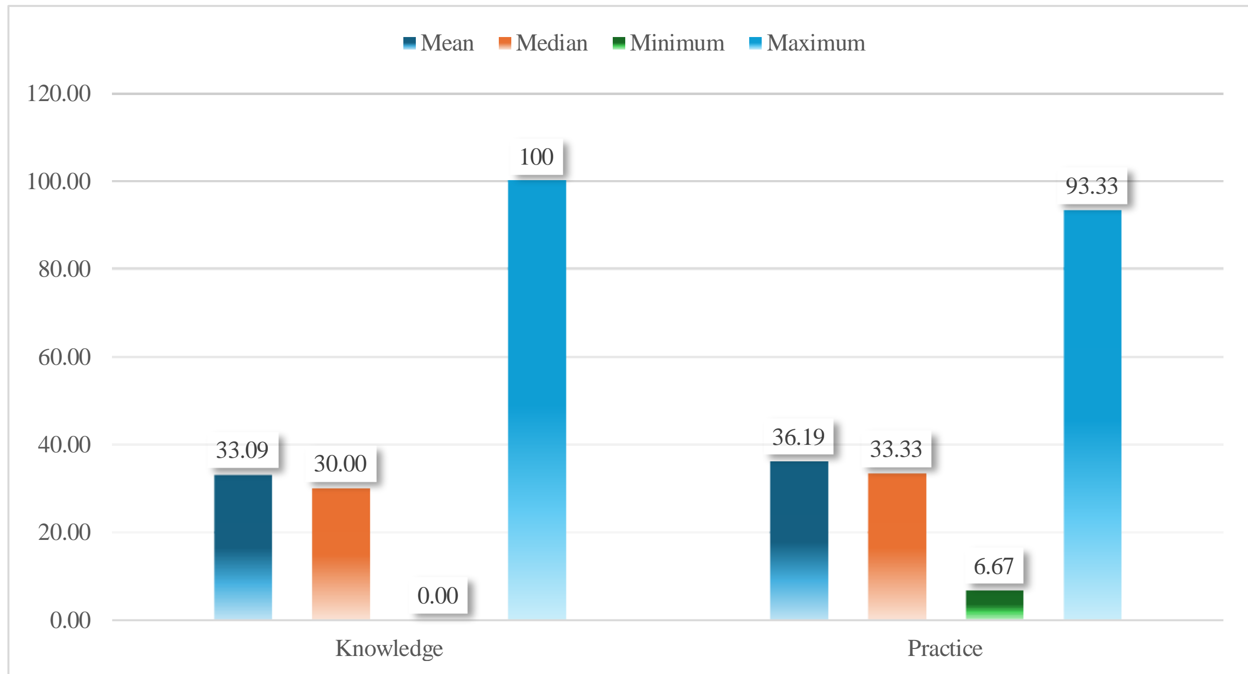


Figure 5: Description of knowledge and practice scores

The scores of knowledge and practice were also classified to three categories: Low (< 60%), Moderate (60% to <80%) and High (80% and higher). Table 5 distributes the frequencies and percentages of knowledge and practice classifications, and shows that majority of the nurses who participated in the current study had low levels of knowledge (84.4%) and practice (87.2%), while only 8.9% and 9.2% of them had moderate levels, respectively, and 6.7% and 3.5% had high levels, respectively. The distribution of knowledge and practice classifications is also illustrated in table 6 and Figure 6.

Table 6: Distribution of knowledge and practice classifications

Domain	**Low**		**Moderate**		**High**	
	N	**%**	**N**	**%**	**N**	**%**
Knowledge	238	84.4%	25	8.9%	19	6.7%
Practice	246	87.2%	26	9.2%	10	3.5%

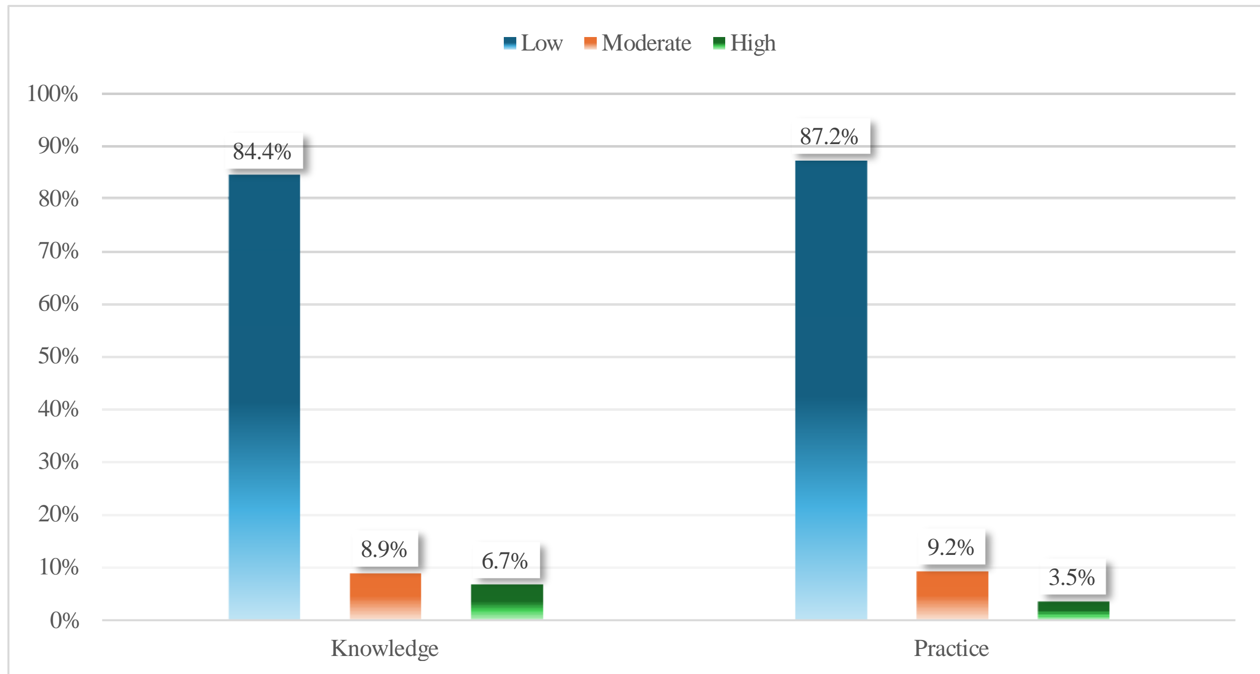


Figure 6: Distribution of knowledge and practice classifications

Part 5: Analytical results

When the scores of knowledge were compared across the categories of nurses' demographic factors, as shown in Table 6, the place of work was the only factors that significantly affected knowledge level (p-value = 0.040), where nurses who worked in the ICU showed higher mean scores (42.86 ± 24.62) and mean rank (172.68) than who worked in medical (mean = 30.32 ± 17.54, mean rank = 135.22) or surgical wards (mean = 32.48 ± 20.51, mean rank = 140.46). On the other hand, gender, experience and training did not significantly relate to differences in knowledge scores (p-value > 0.05). The Relationship between nurses' demographic factors and knowledge about blood transfusion shown in table 7.

Table 7: Relationship between nurses' demographic factors and knowledge about blood transfusion

Factors	Values	Mean	SD	Mean rank	p-value
Gender	Male	33.27	21.44	141.81	0.944
	Female	32.88	21.17	141.14	
Experience	< 1 year	30.57	19.25	134.16	0.177
	1 – 5 years	32.67	21.34	138.83	
	> 5 years	37.67	23.46	158.17	
Place of work	Medical ward	30.32	17.54	135.22	0.040
	Surgical ward	32.48	20.51	140.46	
	ICU	42.86	24.62	172.68	
	Others	30.95	24.87	126.83	
Training	Yes	33.94	23.33	140.26	0.880
	No	32.80	20.59	141.92	

The same was noticed when classifications of knowledge about blood transfusion were compared across the categories of nurses' demographic factors, where nurses who worked in ICU showed the highest percentage of high knowledge (16.7%) compared to who work in medical (1.1%) or surgical wards (5.7%, p-value = 0.013), while the rest of factors did not significantly relate to differences in classifications of knowledge (p-value > 0.05). look to table 8 below.

Table 8: Relationship between nurses' demographic factors and knowledge classifications about blood transfusion

Factors	Values	Low		Moderate		High		X^2	p-value
		N	%	N	%	N	%		
Gender	Male	128	85.3%	10	6.7%	12	8.0%	2.539	0.281
	Female	110	83.3%	15	11.4%	7	5.3%		
Experience	< 1 year	78	89.7%	5	5.7%	4	4.6%	4.827	0.305
	1 – 5 years	113	83.7%	14	10.4%	8	5.9%		
	> 5 years	47	78.3%	6	10.0%	7	11.7%		
Place of work	Medical ward	84	90.3%	8	8.6%	1	1.1%	16.192	0.013
	Surgical ward	90	85.7%	9	8.6%	6	5.7%		
	ICU	29	69.0%	6	14.3%	7	16.7%		
	Others	35	83.3%	2	4.8%	5	11.9%		

Training	Yes	59	83.1%	4	5.6%	8	11.3%	4.027	0.134
	No	179	84.8%	21	10.0%	11	5.2%		

The scores of practice towards blood transfusion were also compared across nurses demographic factors, as shown in Table 8, which shows that place of work was again the only factors that significantly affected practice scores (p-value = 0.001), where nurses working in ICU showed the highest practice scores (mean = 46.98 ± 19.64, mean rank = 188.35) compared to who work in the medical (mean = 32.83 ± 14.12, mean rank = 127.89) or surgical wards (mean = 34.16 ± 15.57, mean rank = 133.95), while the rest of factors did not significantly relate to differences in practice scores (p-value > 0.05). Look to table 9 below.

Table 9: Relationship between demographic factors and practice in blood transfusion

Factors	**Values**	**Mean**	**SD**	**Mean rank**	**p-value**
Gender	Male	36.13	17.10	141.45	0.991
	Female	36.26	17.40	141.56	
Experience	< 1 year	35.63	13.86	145.12	0.563
	1 – 5 years	35.60	17.83	136.23	
	> 5 years	38.33	20.08	148.11	
Place of work	Medical ward	32.83	14.12	127.89	0.001
	Surgical ward	34.16	15.57	133.95	
	ICU	46.98	19.64	188.35	
	Others	37.94	20.59	143.68	
Training	Yes	37.75	18.92	146.91	0.514
	No	35.67	16.61	139.68	

On the other hand, when the classifications of practice towards blood transfusion were compared across the demographic factors of nurses, higher percentage of high practice category was found among nurses who worked in ICU (11.9%) compared to medical or surgical wards (1.1% each, p-value = 0.001), with a higher percentage of moderate category of practice significantly found in female nurses (14.4%) compared to male nurses (4.7%, p-value = 0.012), while experience and training did not show significant relationships with classifications of practice towards blood transfusion, as shown in Table 10.

Table 10: Relationship between nurses' demographic factors and practice classifications about blood transfusion

Factors	Values	Low		Moderate		High		X^2	p-value
		N	%	N	%	N	%		
Gender	Male	136	90.7%	7	4.7%	7	4.7%	8.773	0.012
	Female	110	83.3%	19	14.4%	3	2.3%		
Experience	< 1 year	81	93.1%	5	5.7%	1	1.1%	4.921	0.295
	1 – 5 years	116	85.9%	13	9.6%	6	4.4%		
	> 5 years	49	81.7%	8	13.3%	3	5.0%		
Place of work	Medical ward	87	93.5%	5	5.4%	1	1.1%	21.560	0.001
	Surgical ward	95	90.5%	9	8.6%	1	1.0%		
	ICU	29	69.0%	8	19.0%	5	11.9%		
	Others	35	83.3%	4	9.5%	3	7.1%		
Training	Yes	60	84.5%	7	9.9%	4	5.6%	1.289	0.525
	No	186	88.2%	19	9.0%	6	2.8%		

As shown in Table 10, the correlation between knowledge and practice scores regarding blood transfusion was significant ($r = 0.442$, p-value < 0.001), indicating a moderate, positive correlation between increased knowledge and better practices of blood transfusion among the participating nurses. See table 11 below

Table 11: Correlation between knowledge and attitude towards blood transfusion

	Practice	
	R	p-value
Knowledge	0.442	< 0.001

Conclusion

The study sample had more male nurses (53.2%), experienced between 1 and 5 years (47.9%), working in wards (70.2%) and did not receive training on blood transfusion or products (74.8%).

Knowledge (mean = 33.09 ± 21.28) and practice (mean = 36.19 ± 17.21) scores were generally low, which were also significantly higher among nurses who work in ICU settings. Majority of the nurses had low classification of knowledge (84.4%) and practice (87.2%), with a significantly moderate positive correlation between having higher knowledge and acquiring better practices towards blood transfusion ($r = 0.442$, p-value < 0.001).

Chapter Five

Discussion

5.1 Introduction

The current chapter provides a discussion of the study results, by comparing the findings of the current study with the previous studies, and providing a comprehensive critique to findings and different methodological aspects from the researcher's point of view, which helps in reflecting the strengths and limitations of the study, and in providing context for study results interpretation.

The current cross-sectional study aimed to assess the levels of knowledge and practice of 282 nurses in Palestinian governmental and private hospitals regarding blood transfusion, with the investigation of most related factors, using and structured questionnaire. Overall, the findings revealed that nurses acquire poor knowledge and practice scores, which were significantly higher among ICU nurses, with a significant positive correlation between knowledge and practice scores, indicating that improved knowledge may lead to better transfusion practices. In conclusion, results highlight the urgent need for continuous, structured and targeted programs to enhance transfusion safety and improve patient care outcomes.

5.2 Discussion of the level of knowledge about blood transfusion among the nurses

In the current study, the researcher found that the overall level of knowledge among nurses towards blood transfusion is generally poor, with a mean score of 33.09%, ranging from zero to 100, which indicates a wide variation in the number of correct answers among them. Also, the only factor that was significantly related to the level of knowledge was the place of work, where nurses working at closed unites showed the best knowledge mean scores compared to medical and surgical wards, while still generally poor. Such unsatisfactory results are in parallel with some previous studies,

like the study of Sapkota et al. (2018), where the researchers found some areas of severely low knowledge or practice levels, including that only 16.5% of the nurses stated that they check the permeability of intravenous access before starting blood transfusion, while a higher percentage of 43.5% wear gloves during blood transfusion procedure. In comparison with the current study, there was also a low score of knowledge regarding wearing protective equipment before starting blood transfusion, where only 28.4% of the nurses chose all of the precautions, which included wear gloves (chosen by 18.4%), wearing protective gowns (30.9%) and washing hands (20.6%). Therefore, it can be concluded that the area of personal protective equipment (PPE) during the transfusion of blood is worth focusing on the nursing practices, especially when considering the evidence regarding the risk of hospital-acquired infections transmission if such precautions are not followed (Koleva, 2021; Min et al., 2021).

The general unsatisfactory level of knowledge is also agreed with the previous Indian study of Panchawagh et al. (2020), found that only 9.9% of the nurses had good knowledge scores (above 80%), while 41.7% had poor knowledge, compared to 6.7% for good and 84.4% for low knowledge levels in the current study. Both studies agree on a generally low (or unsatisfactory) knowledge scores, which had a mean of 47% compared to 33.09% between previous and current studies, therefore, both studies agree on a significant knowledge gap among nurses, taking into account the methodological variations, like that they recruited a total of 546 nurses from different wards, which is more than double the sample size in the current study, and were recruited randomly, which is more rigorous than the convenience sampling method of the current study. On the other hand, the current study recruited nurses from a variety of governmental and private hospitals, which is better than collecting from a single site, as in the previous Indian study, which was conducted in a tertiary care hospital. Other differences between the studies including the use of a 25-item multiple-choice

questionnaire in the previous study, compared to a 20-item multiple choice in the current study, while they both covered several areas of blood transfusion, including knowledge, best practices, storage, handling and transfusion reactions recognition and management.

Moreover, the recent Egyptian study of S. Yousef et al. (2024) agrees that more than half of the nurses have poor knowledge scores, and that more than two thirds of the nurses demonstrated incompetent practices, while they also included attitude assessment, but the current study did not, and is recommended to be conducted in future research in Palestine. Despite some variations between both studies, like that they recruited 60 neonatal ICU nurses in two hospitals, which is a smaller sample than the current study (N = 282), but more focused on ICU settings of critical category of patients, they agreed on the positive correlation between the knowledge and practice scores, which indicates that better knowledge improves transfusion practices of safety measures. Other similarities include that both studies used the convenience sampling technique, and a structured tool to evaluate the targeted variables. The previous study showed that more than half of the nurses reported not attending a transfusion training program, compared to a relatively higher percentage of 74.8% in the current study, which highlights the need for continuous education and training in the area of blood transfusion among nurses in variety of settings.

On the other hand, some studies showed contradict results with the current study, like the Malaysian study of Yazid et al. (2023), that showed levels of knowledge among the Malaysian nurses that are significantly higher than the current study, where 56.3% of the nurses had good knowledge category, compared to only 6.7% in the current study. The differences in this main result can be related to other methodological variations, including the use of a validated questionnaire that consisted of 33 questions in the previous study, compared to a 10-question knowledge questionnaire in the current study, despite some similarities with the current study,

such that it was conducted using a cross-sectional design, while it recruited relatively larger sample size (316 vs. 282), and used the same convenience sampling technique, which may have been reflected in wider coverage of aspects related to blood transfusion knowledge. Also, the previous study was conducted on public hospitals only, compared to a variety of governmental and private hospitals in the current study.

5.3 Discussion of the level of practice towards blood transfusion among the nurses

The practice level towards blood transfusion was also generally poor among the nurses who participated in the current study, where the mean score was 36.19%, ranging from 6.67% to 93.33%, which also shows a wide variety in the number of correct answers. Moreover, the place of work was the only factor that significantly related with practice levels, where nurses working in the closed units showed the best practice levels compared to surgical and medical wards, while also showing an overall unsatisfactory practice.

On the other hand, the findings of the current study related to practice levels are in contrast with the findings of Majeed et al. (2020b), who found that less than 50% of the recruited nurses follow the pre-blood transfusion precautions and procedures, while more than 50% of them showed appropriate practices, and less than 50% continued on practicing correctly after blood transfusion initiation, while the current study found an overall low scores of practice (mean = 36.19%), which was lower than the previous study. In conclusion, both studies highlight the lack of practice among nurses regarding post-transfusion actions, despite the overall difference in the practice scores. Also, the previous study was conducted in different wards, more widely than the coverage of the current study, which can interpret the differences in the general findings.

The Indian study of Panchawagh et al. (2020) also showed different practice results compared to the current study, where they had a mean of around 66%, with 66.7% of the nurses having a satisfactory category of practice, compared to a mean score of 36.19% in the current study, with 87.2% having poor practice levels. The previous study indicated that Indian nurses tend to have more of experience-based skill development, which means that knowledge is somehow more independent of practices, while the current study highlighted the significantly positive correlation between knowledge and practice scores. Also, they found that nurses with 1 – 5 years of experience performed better than newly graduated and senior nurses, while the current study found no significant differences in knowledge and practice scores across experience categories. On the other hand, both studies agreed that ICU nurses significantly have higher knowledge and better practice scores than other departments, which is mostly related to more exposure of blood transfusion procedures, with the focus on the need for training programs in this field, which showed a significant impact on improving transfusion knowledge and safety.

5.4 The need for education and training about blood transfusion for nurses

The current study did not implement an interventional design to investigate the significance of changes in knowledge and practice scores after a specific training, lecturing or other interventions. The main limitation to such design is time limitation, where academic requirements and geopolitical situation in Palestine hinder the accomplishment of such aim on a wide scale of hospitals that are included in the current study, as well as resources, including lack of appropriate funding for such a project in a short time. Therefore, it is recommended for policymakers and continuous education bodies, at least at the level of individual hospitals, to implement experimental studies on nurses that aim to improve their knowledge, attitude and practices of blood transfusion.

Several studies highlighted the importance and effectiveness of interventional approaches in blood transfusion training for nurses, such as Badawy et al. (2024), who implemented a training module on blood transfusion for pediatric nurses and found a highly significant improvement in knowledge and practice scores after training (p-value < 0.001), and Aboelnasr et al. (2024), who conducted a simulation-based training program, which showed a statistically significant increase in nurses' knowledge, compliance and self-confidence with blood transfusion protocols. Also, Aldeen Ahmed and Younis (2024) conducted an educational program for neonatal units nurses, which led to significant increases in correct transfusion practices, which helped in the reduction of errors in handling blood products.

In the current study, a very high percentage of nurses (88.6%) agreed that there is a need for repetitive education on blood transfusion, blood and blood products, which is agreed by the previous Malaysian study of Yazid et al. (2023), who also highlighted the need for targeted education and continuous training to enhance transfusion-related knowledge, while it lacked the investigation of knowledge differences across nurses' demographic and professional factors, which gives the current study the advantage over it in this area, and helps in determining the related factors and areas of improvement among specific categories.

In the light of the current study findings, there is a justification for future interventional studies in Palestinian hospitals, where it is important to conduct experimental and interventional studies, given the significant deficiencies in knowledge and practice scores. Such studies will help in measuring the direct impact of training on knowledge and practice improvements, as well as ensuring the adherence to international transfusion safety guidelines, and therefore reducing transfusion-related risks, and developing standardized hospital training programs to improve competency levels.

Conclusion

The findings of this study reveal that both knowledge and practice levels related to blood transfusion among nurses in North West Bank hospitals are insufficient in several critical areas. While some nurses demonstrated adequate understanding of basic concepts, many showed a lack of awareness regarding essential procedures and safety precautions. This knowledge-practice gap poses potential risks to patient safety and underscores the need for comprehensive and continuous educational programs targeting transfusion safety, error prevention, and evidence-based practices. Hospital administrations and nursing educators must collaborate to implement standardized training modules and periodic evaluations to ensure safe and effective transfusion practices across all clinical settings.

Recommendations

Based on the discussion of the current study results, the researcher proposes the following recommendations:

Recommendations to nurses

1- Engagement in continuous education, by participating in ongoing training programs that focus on protocols, infection control and emergency management related to blood transfusion, which will help in enhancing knowledge and practice levels.

2- Improve the compliance with PPE use, by adhering to guidelines of wearing gloves, gowns and practical proper hand hygiene during transfusion procedures to minimize the risk of infection.

3- Regularly update clinical skills related to blood transfusion, like skills of IV access verification, transfusion monitoring and handling adverse reactions, using refresher courses and simulation-based training.

4- Adopt evidence-based practices, by staying informed about updated blood transfusion guidelines and research-based protocols to improve decision-making and patient outcomes.

Recommendations to policymakers

1- Develop and implement standardized training programs, by mandating structured them in hospitals, and therefore all nurses receive adequate education, including the use of simulation-based and hands-on workshops.

2- Integrate blood transfusion education more into nursing curricula, in both undergraduate and postgraduate programs, which will help future nurses to equip with essential transfusion competencies.

3- Enhance availability of protective equipment and resources, which will facilitate safe transfusion practices.

4- Conduct periodic competency assessment, using evaluations and audits, to identify gaps and areas for improvement.

5- Support research and evidence-based policy development, by funding and supporting interventional studies to assess the effectiveness of training programs on nurses' knowledge and practice levels of blood transfusion, which ensures data-driven policy improvements.

Limitations

The current study is subject to the following limitations:

1- The use of cross-sectional design, which limits the ability to determine causality or observe changes over time in response to interventions.

2- The use of convenience sampling, which may have resulted in selection bias, while the use of other probability sampling methods is limited by the nature of nursing shift rotation. The use of convenience sampling limits the generalizability of study findings of the entire nursing population.

3- Reliance on self-reported data using questionnaires, which can be affected by social desirability bias, as nurses may overestimate their knowledge and adherence to best practices.

4- Time and geopolitical limitations in Palestine, including academic deadlines and the geopolitical situation in Palestine that limits transportation, which may have allowed for expansion to more hospitals and the implementation of interventional design and follow-ups.

References

Aboelnasr, A., Mohamed Elsayed, M., & Ali Ibrahim Almanzlawi, H. (2024). Effectiveness of Simulation-Based Training on Nurses' Performance, Self-Confidence, and Satisfaction Regarding Blood Transfusion. *Egyptian Journal of Health Care*.

Akyol, A. (2019). Assessing knowledge of nurses on blood transfusion in Turkey. *International Journal of Caring Sciences*, *12*(1), 521-528.

Aldeen Ahmed, A. S., & Younis, N. M. (2024). Educational Program on Nurses Knowledge about Blood Exchange Transfusion in Neonatal Care Units. *International Journal of Pharmaceutical and Bio-Medical Science*.

Ali, Y., Khan, S., Ali, J., Ejaz, K., Fatima, K., Qayyum, S., Younas, M., & Farooq, S. U. (2024). KNOWLEDGE AND PRACTICES OF NURSES REGARDING BLOOD TRANSFUSION IN A PUBLIC SECTOR HOSPITAL, PAKISTAN. *Journal of Population Therapeutics and Clinical Pharmacology*, *31*(2), 84-91.

Badawy, G., Ebrahem, G., & Hassanen, E. (2024). Effectiveness of Implementing a Training Module about Blood Transfusion on Pediatric Nurses' Competence. *International Egyptian Journal of Nursing Sciences and Research*.

Barnett, T. A., Koushik, A., & Schuster, T. (2023). Cross-sectional studies and causal inference - it's complicated. *American journal of epidemiology*.

Bediako, A. A., Ofosu-Poku, R., & Druye, A. A. (2021). Safe blood transfusion practices among nurses in a major referral center in Ghana. *Advances in Hematology*, *2021*.

Bolton-Maggs, P. (2019). Conference report: international haemovigilance seminar and the SHOT annual symposium, 10–12 July 2018. *Transfusion Medicine*, *29*(4), 247-252.

Bowman, Z., Fei, N., Ahn, J., Wen, S., Cumpston, A., Shah, N., Craig, M., Perrotta, P. L., & Kanate, A. S. (2019). Single versus double-unit transfusion: Safety and efficacy for patients with hematologic malignancies. *European journal of haematology*, *102*(5), 383-388.

Bradbury, M., & Cruickshank, J. P. (2000). Blood transfusion: crucial steps in maintaining safe practice. *British Journal of Nursing*, *9*(3), 134-138.

Bralić, N., & Buljan, I. (2023). The association between research design and the perceived treatment effectiveness: a cross-sectional study. *Frontiers in medicine*, *10*, 1220999.

Creswell, J. W. (2018). *Qualitative, quantitative, and mixed methods approaches+ a crash course in statistics*. Sage publications.

Di Minno, G., Perno, C. F., Tiede, A., Navarro, D., Canaro, M., Güertler, L., & Ironside, J. W. (2016). Current concepts in the prevention of pathogen transmission via blood/plasma-derived products for bleeding disorders. *Blood reviews*, *30*(1), 35-48.

Elhy, A., & Kasemy, Z. A. A. (2017). Nurses' knowledge assessment regarding blood transfusion to ensure patient safety. *IOSR Journal of Nursing and Health Science*, *6*(02), 104-111.

Encan, B., & Akin, S. (2019). Knowledge of blood transfusion among nurses. *The Journal of Continuing Education in Nursing*, *50*(4), 176-182.

Feyisa, T., Tesfaye Kiya, G., & Maleko, W. A. (2021). Assessment of recipients' characteristics, transfusion appropriateness, and utilization pattern of blood and blood products in Jimma Medical Center, Jimma, Ethiopia. *Plos one*, *16*(4), e0250623.

Fong, I. W. (2020). *Current trends and concerns in infectious diseases.*

Frietsch, T., Thomas, D., Schöler, M., Fleiter, B., Schipplick, M., Spannagl, M., Knels, R., & Nguyen, X. (2017). Administration safety of blood products-lessons learned from a national registry for transfusion and hemotherapy practice. *Transfusion Medicine and Hemotherapy*, *44*(4), 240-254.

Henneman, E. A., Andrzejewski Jr, C., Gawlinski, A., McAfee, K., Panaccione, T., & Dziel, K. (2017). Transfusion-associated circulatory overload: evidence-based strategies to prevent, identify, and manage a serious adverse event. *Critical care nurse*, *37*(5), 58-65.

Hoffmeister, L. V., & Moura, G. M. S. S. d. (2015). Use of identification wristbands among patients receiving inpatient treatment in a teaching hospital. *Revista latino-americana de enfermagem*, *23*, 36-43.

Hurrell, K. (2014). Safe administration of blood components. *Nursing times*, *110*(38), 16-19.

Jogi, I. E., Mohanan, N., & Nedungalaparambil, N. M. (2021). Bedside Blood Transfusion–What Nurses Know and Perform: A Cross-Sectional Study from A Tertiary-Level Cancer Hospital in Rural Kerala. *Asia-Pacific journal of oncology nursing*, *8*(2), 197-203.

Kavaklioglu, A. B., Dagci, S., & Oren, B. (2017). Determination of health workers' level of knowledge about blood transfusion. *Northern clinics of Istanbul*, *4*(2), 165.

Khetan, D., Katharia, R., Pandey, H. C., Chaudhary, R., Harsvardhan, R., Pandey, H., & Sonkar, A. (2018). Assessment of bedside transfusion practices at a tertiary care center: A step closer to controlling the chaos. *Asian journal of transfusion science*, *12*(1), 27-33.

Kipkulei, J., & Lotodo, C. (2019). Knowledge of Blood Transfusion Among Nurses at a Teaching and Referral Hospital in Western Kenya. *Age (years)*, *30*, 30-34.

Kipkulei, J. C., Buziba, N. G., & Mining, S. K. (2019). Documentation of the Clinical Blood Transfusion Practice at a Teaching and Referral Hospital in Western Kenya. *American Journal of Health Research*, *7*(1), 8-11.

Koleva, G. (2021). HANDS HYGIENE AND PERSONAL PROTECTIVE EQUIPMENT – MONITORING OF THEIR APPLICATION IN THE NURSES' CLINICAL PRACTICE. *Journal of IMAB - Annual Proceeding (Scientific Papers)*.

Kotzé, A., Harris, A., Baker, C., Iqbal, T., Lavies, N., Richards, T., Ryan, K., Taylor, C., & Thomas, D. (2015). British committee for standards in haematology guidelines on the identification and management of pre-operative anaemia. *British Journal of Haematology*, *171*(3), 322-331.

Lee, E. L. S., Rahim, A., Arzuar, N., Din, T., & Azdiana, S. (2016). Knowledge of blood transfusion among nurses at hospital pulau pinang: nursing responsibilities and patient management related to transfusion reactions. *Education in Medicine Journal*, *8*(4).

Majeed, H., Parveen, K., Hussain, M., Afzal, M., & Gilani, S. A. (2020). Assessment of nurses' practices regarding blood transfusion. *Merit Res J Med Med Sci*, *8*(8), 396-402.

Malako, D., Yoseph, F., & Bekele, M. L. (2019). Assessment of knowledge, attitude and practice and associated factors of blood donation among health care workers in Ethiopia: a cross-sectional study. *BMC hematology*, *19*, 1-8.

McClelland, D. (2002). Handbook of Transfusion Medicine. In: Wiley Online Library.

Min, H. S., Moon, S., Jang, Y., Cho, I., Jeon, J., & Sung, H. K. (2021). The Use of Personal Protective Equipment among Frontline Nurses in a Nationally Designated COVID-19 Hospital during the Pandemic. *Infection & Chemotherapy*, *53*, 705 - 717.

Mohd Noor, N. H., Saad, N. H., Khan, M., Hassan, M. N., Ramli, M., Bahar, R., Mohamed Yusoff, S., Iberahim, S., Wan Ab Rahman, W. S., & Zulkafli, Z. (2021). Blood transfusion

knowledge among nurses in Malaysia: a university hospital experience. *International Journal of Environmental Research and Public Health*, *18*(21), 11194.

Nada, H. A. A. A. (2021). *Nurses' Knowledge and Practices about BloodTransfusion in Gaza Governmental Hospitals* Al-Quds University].

Najafpour, Z., Hasoumi, M., Behzadi, F., Mohamadi, E., Jafary, M., & Saeedi, M. (2017). Preventing blood transfusion failures: FMEA, an effective assessment method. *BMC health services research*, *17*, 1-9.

Norfolk, D. R., & Hartley, F. (2014). Management of Patients Who Refuse Blood Transfusion. *Haematology in Critical Care: A Practical Handbook*, 118-122.

Nunes da Silva, K. F., Dagma Duarte, R., Floriano, D. R., Foroni Andrade, L., Lumênia Tavares, J., dos Santos Felix, M. M., Bonato Zuffi, F., da Silva Pires, P., & Barbosa, M. H. (2017). Blood transfusion in Intensive Care Units: knowledge of the nursing team. *Avances en Enfermería*, *35*(3), 313-323.

Panchawagh, S. J., Melinkeri, S., & Panchawagh, M. J. (2020). Assessment of knowledge and practice of blood transfusion among nurses in a tertiary care hospital in India. *Indian Journal of Hematology and Blood Transfusion*, *36*, 393-398.

Polit, D. F., & Beck, C. T. (2010). *Essentials of nursing research: Appraising evidence for nursing practice*. Lippincott Williams & Wilkins.

Reis, V. N. d., Paixão, I. B., Perrone, A. C. A. d. S. J., Monteiro, M. I., & Santos, K. B. d. (2016). Transfusion monitoring: care practice analysis in a public teaching hospital. *Einstein (São Paulo)*, *14*, 41-46.

Roudsari, D. M., Feizi, S., & Maghsudlu, M. (2021). Nurses' hemovigilance knowledge and performance after teach-back, concept map, and lecture: A quasi-experimental study. *Heliyon*, *7*(1).

Rudrappan, R. B. (2019). Evaluating the knowledge and practices of nurses and paramedics in blood transfusion services–A survey in the states of Tamil Nadu and Pondicherry, India. *Journal of education and health promotion*, *8*(1), 48.

S. Yousef, R., M. Adly, R., & R. Mohamed, H. (2024). Nurses' Performance during Blood Transfusion for Neonates. *Egyptian Journal of Health Care*.

Sapkota, A., Poudel, S., Sedhain, A., & Khatiwada, N. (2018). Blood transfusion practice among healthcare personnel in Nepal: an observational study. *Journal of blood transfusion*, *2018*.

Sarı, İ., & Altuntaş, F. (2007). Transfüzyon ilkeleri ve erken komplikasyonlar. *Türk Hematoloji Derneği-Hematolojide Destek Tedavileri ve İnfeksiyonlar Kurs Kitabı*, 64-76.

Shah, A., Stanworth, S., & McKechnie, S. (2015). Evidence and triggers for the transfusion of blood and blood products. *Anaesthesia*, *70*, 10-e13.

Shaikh, M. H., Bibi, A., & Ali, R. (2023). Nurse's Knowledge Regarding Blood Transfusion in a Tertiary Care Hospital Karachi, Pakistan: Nurse's Knowledge Regarding Blood Transfusion. *NURSEARCHER (Journal of Nursing & Midwifery Sciences)*, 19-23.

Soliman, H. M. M., & Elhapashy, H. (2021). Nurses' Competence in Safety Blood Transfusion: The Impact of a Training Module. *International Journal of Nursing Education*.

Sullivan, K. D. (2015). Evaluating the frequency of vital sign monitoring during blood transfusion: an evidence-based practice initiative. *Number 5/October 2015*, *19*(5), 516-520.

Talati, S., Gupta, A. K., & Jain, A. (2016). Knowledge and awareness among nurses regarding the blood transfusion services and practices in a tertiary care teaching hospital. *Asian journal of transfusion science*, *10*(2), 166-168.

Vaghar, M. I. (2018). The impact of an educational program on blood and blood products transfusion on nurses' level of knowledge and performance. *Journal of medicine and life*, *11*(3), 238.

Vaismoradi, M., Tella, S., A. Logan, P., Khakurel, J., & Vizcaya-Moreno, F. (2020). Nurses' adherence to patient safety principles: a systematic review. *International Journal of Environmental Research and Public Health*, *17*(6), 2028.

Witczak, I., Rypicz, Ł., Karniej, P., Młynarska, A., Kubielas, G., & Uchmanowicz, I. (2021). Rationing of nursing care and patient safety. *Frontiers in psychology*, *12*, 676970.

Wood, E. M., Ang, A., Bisht, A., Bolton-Maggs, P., Bokhorst, A., Flesland, O., Land, K., Wiersum-Osselton, J., Schipperus, M., & Tiberghien, P. (2019). International haemovigilance: what have we learned and what do we need to do next? *Transfusion Medicine*, *29*(4), 221-230.

Yami, A., Darbandi, A., Saber, E., Tabrizi Namini, M., & Gharehbaghian, A. (2021). Assessment the knowledge of blood transfusion in Iranian nurses of Tehran's hospitals. *Transfusion Medicine*, *31*(6), 459-466.

Yazid, J., Rajab, A. M., Yusof, S., & Wilandika, A. (2023). Assessing Malaysian Nurses' Knowledge of Blood Transfusion Procedures and Identifying Knowledge Gaps: A cross-sectional study. *Environment-Behaviour Proceedings Journal*.

Zuleika, P., & Legiran. (2022). Cross-Sectional Study as Research Design in Medicine.

Aboelnasr, A., Mohamed Elsayed, M., & Ali Ibrahim Almanzlawi, H. (2024). Effectiveness of Simulation-Based Training on Nurses' Performance, Self-Confidence, and Satisfaction Regarding Blood Transfusion. *Egyptian Journal of Health Care*.

Akyol, A. (2019). Assessing knowledge of nurses on blood transfusion in Turkey. *International Journal of Caring Sciences*, *12*(1), 521-528.

Aldeen Ahmed, A. S., & Younis, N. M. (2024). Educational Program on Nurses Knowledge about Blood Exchange Transfusion in Neonatal Care Units. *International Journal of Pharmaceutical and Bio-Medical Science*.

Ali, Y., Khan, S., Ali, J., Ejaz, K., Fatima, K., Qayyum, S., Younas, M., & Farooq, S. U. (2024). KNOWLEDGE AND PRACTICES OF NURSES REGARDING BLOOD TRANSFUSION IN A PUBLIC SECTOR HOSPITAL, PAKISTAN. *Journal of Population Therapeutics and Clinical Pharmacology*, *31*(2), 84-91.

Badawy, G., Ebrahem, G., & Hassanen, E. (2024). Effectiveness of Implementing a Training Module about Blood Transfusion on Pediatric Nurses' Competence. *International Egyptian Journal of Nursing Sciences and Research*.

Bediako, A. A., Ofosu-Poku, R., & Druye, A. A. (2021). Safe blood transfusion practices among nurses in a major referral center in Ghana. *Advances in Hematology*, *2021*.

Bolton-Maggs, P. (2019). Conference report: international haemovigilance seminar and the SHOT annual symposium, 10–12 July 2018. *Transfusion Medicine*, *29*(4), 247-252.

Bowman, Z., Fei, N., Ahn, J., Wen, S., Cumpston, A., Shah, N., Craig, M., Perrotta, P. L., & Kanate, A. S. (2019). Single versus double-unit transfusion: Safety and efficacy for patients with hematologic malignancies. *European journal of haematology*, *102*(5), 383-388.

Bradbury, M., & Cruickshank, J. P. (2000). Blood transfusion: crucial steps in maintaining safe practice. *British Journal of Nursing*, *9*(3), 134-138.

Creswell, J. W. (2018). *Qualitative, quantitative, and mixed methods approaches+ a crash course in statistics*. Sage publications.

Di Minno, G., Perno, C. F., Tiede, A., Navarro, D., Canaro, M., Güertler, L., & Ironside, J. W. (2016). Current concepts in the prevention of pathogen transmission via blood/plasma-derived products for bleeding disorders. *Blood reviews*, *30*(1), 35-48.

Elhy, A., & Kasemy, Z. A. A. (2017). Nurses' knowledge assessment regarding blood transfusion to ensure patient safety. *IOSR Journal of Nursing and Health Science*, *6*(02), 104-111.

Encan, B., & Akin, S. (2019). Knowledge of blood transfusion among nurses. *The Journal of Continuing Education in Nursing*, *50*(4), 176-182.

Feyisa, T., Tesfaye Kiya, G., & Maleko, W. A. (2021). Assessment of recipients' characteristics, transfusion appropriateness, and utilization pattern of blood and blood products in Jimma Medical Center, Jimma, Ethiopia. *Plos one*, *16*(4), e0250623.

Fong, I. W. (2020). *Current trends and concerns in infectious diseases*.

Frietsch, T., Thomas, D., Schöler, M., Fleiter, B., Schipplick, M., Spannagl, M., Knels, R., & Nguyen, X. (2017). Administration safety of blood products-lessons learned from a national registry for transfusion and hemotherapy practice. *Transfusion Medicine and Hemotherapy*, *44*(4), 240-254.

Henneman, E. A., Andrzejewski Jr, C., Gawlinski, A., McAfee, K., Panaccione, T., & Dziel, K. (2017). Transfusion-associated circulatory overload: evidence-based strategies to prevent, identify, and manage a serious adverse event. *Critical care nurse*, *37*(5), 58-65.

Hijji, B., Parahoo, K., Hussein, M. M., & Barr, O. (2013). Knowledge of blood transfusion among nurses. *Journal of clinical nursing*, *22*(17-18), 2536-2550.

Hijji, B. M., Oweis, A. E., & Dabbour, R. S. (2012). Measuring knowledge of blood transfusion: A survey of Jordanian nurses. *Am Int J Contemp Res*, *2*(10), 77-94.

Hoffmeister, L. V., & Moura, G. M. S. S. d. (2015). Use of identification wristbands among patients receiving inpatient treatment in a teaching hospital. *Revista latino-americana de enfermagem*, *23*, 36-43.

Hurrell, K. (2014). Safe administration of blood components. *Nursing times*, *110*(38), 16-19.

Jogi, I. E., Mohanan, N., & Nedungalaparambil, N. M. (2021). Bedside Blood Transfusion–What Nurses Know and Perform: A Cross-Sectional Study from A Tertiary-Level Cancer Hospital in Rural Kerala. *Asia-Pacific journal of oncology nursing*, *8*(2), 197-203.

Kavaklioglu, A. B., Dagci, S., & Oren, B. (2017). Determination of health workers' level of knowledge about blood transfusion. *Northern clinics of Istanbul*, *4*(2), 165.

Khetan, D., Katharia, R., Pandey, H. C., Chaudhary, R., Harsvardhan, R., Pandey, H., & Sonkar, A. (2018). Assessment of bedside transfusion practices at a tertiary care center: A step closer to controlling the chaos. *Asian journal of transfusion science*, *12*(1), 27-33.

Kipkulei, J., & Lotodo, C. (2019). Knowledge of Blood Transfusion Among Nurses at a Teaching and Referral Hospital in Western Kenya. *Age (years)*, *30*, 30-34.

Kipkulei, J. C., Buziba, N. G., & Mining, S. K. (2019). Documentation of the Clinical Blood Transfusion Practice at a Teaching and Referral Hospital in Western Kenya. *American Journal of Health Research*, *7*(1), 8-11.

Koleva, G. (2021). HANDS HYGIENE AND PERSONAL PROTECTIVE EQUIPMENT – MONITORING OF THEIR APPLICATION IN THE NURSES' CLINICAL PRACTICE. *Journal of IMAB - Annual Proceeding (Scientific Papers)*.

Kotzé, A., Harris, A., Baker, C., Iqbal, T., Lavies, N., Richards, T., Ryan, K., Taylor, C., & Thomas, D. (2015). British committee for standards in haematology guidelines on the identification and management of pre-operative anaemia. *British Journal of Haematology*, *171*(3), 322-331.

Lee, E. L. S., Rahim, A., Arzuar, N., Din, T., & Azdiana, S. (2016). Knowledge of blood transfusion among nurses at hospital pulau pinang: nursing responsibilities and patient management related to transfusion reactions. *Education in Medicine Journal*, *8*(4).

Majeed, H., Parveen, K., Hussain, M., Afzal, M., & Gilani, G. (2020a). Assessment of Nurses' practices regarding blood transfusion. *Journal of Medicine and Medical Science*, *8*(8), 396-402.

Majeed, H., Parveen, K., Hussain, M., Afzal, M., & Gilani, S. A. (2020b). Assessment of nurses' practices regarding blood transfusion. *Merit Res J Med Med Sci*, *8*(8), 396-402.

Malako, D., Yoseph, F., & Bekele, M. L. (2019). Assessment of knowledge, attitude and practice and associated factors of blood donation among health care workers in Ethiopia: a cross-sectional study. *BMC hematology*, *19*, 1-8.

McClelland, D. (2002). Handbook of Transfusion Medicine. In: Wiley Online Library.

Min, H. S., Moon, S., Jang, Y., Cho, I., Jeon, J., & Sung, H. K. (2021). The Use of Personal Protective Equipment among Frontline Nurses in a Nationally Designated COVID-19 Hospital during the Pandemic. *Infection & Chemotherapy*, *53*, 705 - 717.

Mohd Noor, N. H., Saad, N. H., Khan, M., Hassan, M. N., Ramli, M., Bahar, R., Mohamed Yusoff, S., Iberahim, S., Wan Ab Rahman, W. S., & Zulkafli, Z. (2021). Blood transfusion knowledge among nurses in Malaysia: a university hospital experience. *International Journal of Environmental Research and Public Health*, *18*(21), 11194.

Nada, H. A. A. A. (2021). *Nurses' Knowledge and Practices about BloodTransfusion in Gaza Governmental Hospitals* Al-Quds University].

Najafpour, Z., Hasoumi, M., Behzadi, F., Mohamadi, E., Jafary, M., & Saeedi, M. (2017). Preventing blood transfusion failures: FMEA, an effective assessment method. *BMC health services research*, *17*, 1-9.

Nieswiadomy, R., & Bailey, C. (2017). Foundations of nursing research, Pearson.

Norfolk, D. R., & Hartley, F. (2014). Management of Patients Who Refuse Blood Transfusion. *Haematology in Critical Care: A Practical Handbook*, 118-122.

Nunes da Silva, K. F., Dagma Duarte, R., Floriano, D. R., Foroni Andrade, L., Lumênia Tavares, J., dos Santos Felix, M. M., Bonato Zuffi, F., da Silva Pires, P., & Barbosa, M. H. (2017). Blood transfusion in Intensive Care Units: knowledge of the nursing team. *Avances en Enfermería*, *35*(3), 313-323.

Panchawagh, S. J., Melinkeri, S., & Panchawagh, M. J. (2020). Assessment of knowledge and practice of blood transfusion among nurses in a tertiary care hospital in India. *Indian Journal of Hematology and Blood Transfusion*, *36*, 393-398.

Polit, D. F., & Beck, C. T. (2010). *Essentials of nursing research: Appraising evidence for nursing practice*. Lippincott Williams & Wilkins.

Reis, V. N. d., Paixão, I. B., Perrone, A. C. A. d. S. J., Monteiro, M. I., & Santos, K. B. d. (2016). Transfusion monitoring: care practice analysis in a public teaching hospital. *Einstein (São Paulo)*, *14*, 41-46.

Roudsari, D. M., Feizi, S., & Maghsudlu, M. (2021). Nurses' hemovigilance knowledge and performance after teach-back, concept map, and lecture: A quasi-experimental study. *Heliyon*, *7*(1).

Rudrappan, R. B. (2019). Evaluating the knowledge and practices of nurses and paramedics in blood transfusion services–A survey in the states of Tamil Nadu and Pondicherry, India. *Journal of education and health promotion*, *8*(1), 48.

S. Yousef, R., M. Adly, R., & R. Mohamed, H. (2024). Nurses' Performance during Blood Transfusion for Neonates. *Egyptian Journal of Health Care*.

Sapkota, A., Poudel, S., Sedhain, A., & Khatiwada, N. (2018). Blood transfusion practice among healthcare personnel in Nepal: an observational study. *Journal of blood transfusion*, *2018*.

Sarı, İ., & Altuntaş, F. (2007). Transfüzyon ilkeleri ve erken komplikasyonlar. *Türk Hematoloji Derneği-Hematolojide Destek Tedavileri ve İnfeksiyonlar Kurs Kitabı*, 64-76.

Shah, A., Stanworth, S., & McKechnie, S. (2015). Evidence and triggers for the transfusion of blood and blood products. *Anaesthesia*, *70*, 10-e13.

Shaikh, M. H., Bibi, A., & Ali, R. (2023). Nurse's Knowledge Regarding Blood Transfusion in a Tertiary Care Hospital Karachi, Pakistan: Nurse's Knowledge Regarding Blood Transfusion. *NURSEARCHER (Journal of Nursing & Midwifery Sciences)*, 19-23.

Sullivan, K. D. (2015). Evaluating the frequency of vital sign monitoring during blood transfusion: an evidence-based practice initiative. *Number 5/October 2015*, *19*(5), 516-520.

Talati, S., Gupta, A. K., & Jain, A. (2016). Knowledge and awareness among nurses regarding the blood transfusion services and practices in a tertiary care teaching hospital. *Asian journal of transfusion science*, *10*(2), 166-168.

Vaghar, M. I. (2018). The impact of an educational program on blood and blood products transfusion on nurses' level of knowledge and performance. *Journal of medicine and life*, *11*(3), 238.

Vaismoradi, M., Tella, S., A. Logan, P., Khakurel, J., & Vizcaya-Moreno, F. (2020). Nurses' adherence to patient safety principles: a systematic review. *International Journal of Environmental Research and Public Health*, *17*(6), 2028.

Witczak, I., Rypicz, Ł., Karniej, P., Młynarska, A., Kubielas, G., & Uchmanowicz, I. (2021). Rationing of nursing care and patient safety. *Frontiers in psychology*, *12*, 676970.

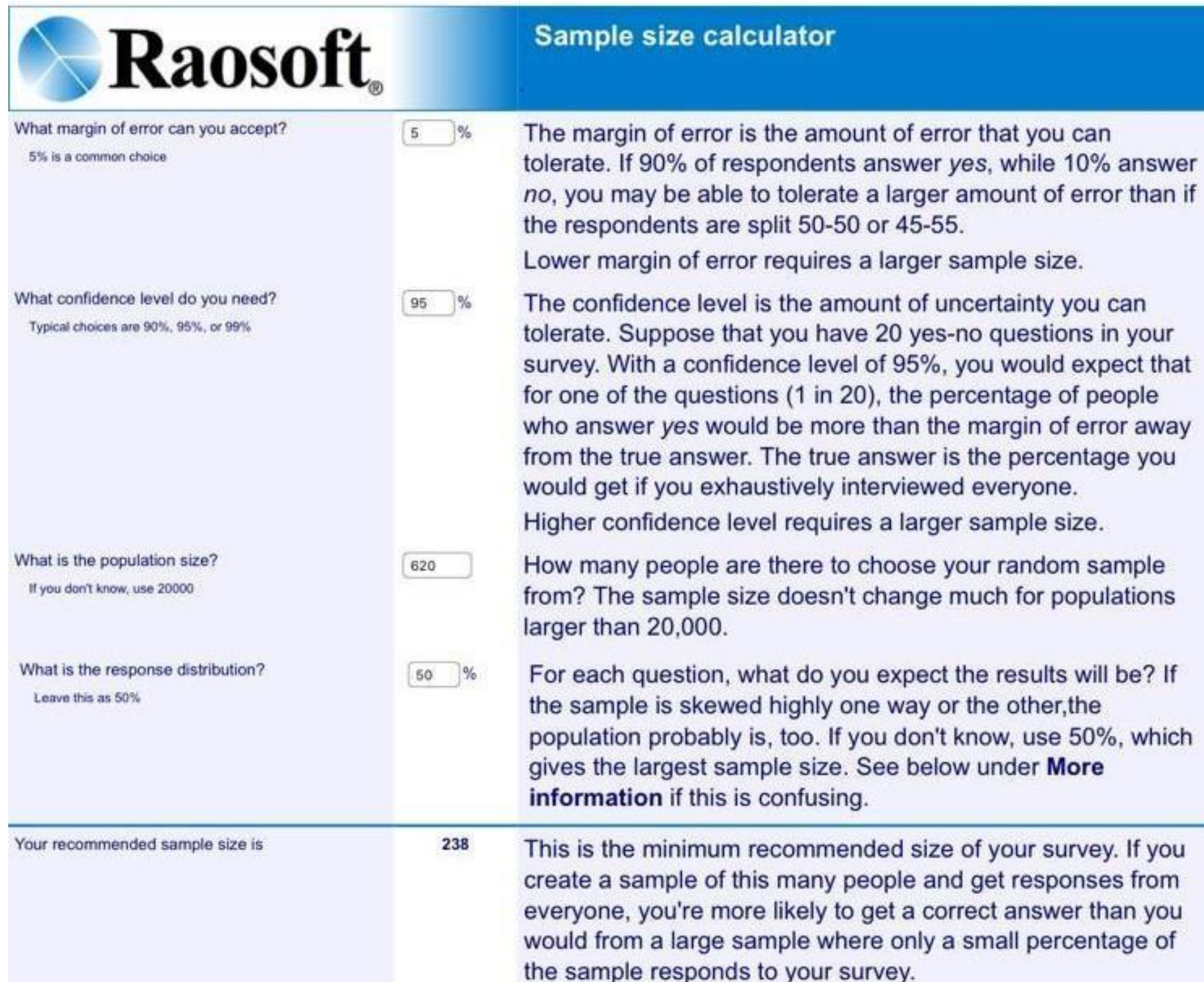
Wood, E. M., Ang, A., Bisht, A., Bolton-Maggs, P., Bokhorst, A., Flesland, O., Land, K., Wiersum-Osselton, J., Schipperus, M., & Tiberghien, P. (2019). International haemovigilance: what have we learned and what do we need to do next? *Transfusion Medicine*, *29*(4), 221-230.

Yami, A., Darbandi, A., Saber, E., Tabrizi Namini, M., & Gharehbaghian, A. (2021). Assessment the knowledge of blood transfusion in Iranian nurses of Tehran's hospitals. *Transfusion Medicine*, *31*(6), 459-466.

Yazid, J., Rajab, A. M., Yusof, S., & Wilandika, A. (2023). Assessing Malaysian Nurses' Knowledge of Blood Transfusion Procedures and Identifying Knowledge Gaps: A cross-sectional study. *Environment-Behaviour Proceedings Journal*.

Appendices

Appendix (1) sample size calculations



Appendix (2): Permission of Original Tool Developer Permission of Original Tool Developer

Suhrud Panchawagh

to me

20 Nov 2022 Details

Thank you for your mail.

We are willing to share our questionnaire only if you cite us in the publication. Otherwise, our institution and the Indian Journal of Hematology and Blood Transfusion will be forced to take legal action.

If you agree to these terms, we are willing to share the questionnaire.

الملخص

الخلفية: يُعد نقل الدم إجراءً طبيًا أساسيًا وشائعًا يمكن أن ينقذ الأرواح، لكنه قد يؤدي إلى مضاعفات إذا لم يُدار بشكل صحيح. يلعب الممرضون دورًا حاسمًا في عملية نقل الدم، وغالبًا ما تحدث الأخطاء بسبب نقص المعرفة والممارسة، خاصة في البيئات التي تفتقر إلى التدريب المستمر. هدفت هذه الدراسة إلى تقييم مستوى المعرفة والممارسة المتعلقة بنقل الدم لدى الممرضين العاملين في المستشفيات في شمال الضفة الغربية في فلسطين

الطرق: أُجريت دراسة مقطعية كمية وصفية شملت 282 ممرضًا وممرضة يعملون في الأقسام الطبية والجراحية وأقسام العناية المركزة في المستشفيات الواقعة في شمال الضفة الغربية في فلسطين. استُخدم استبيان مُنظّم، مُعدّل من أدوات مُحقّقة الصدق، لتقييم المعرفة (10 فقرات) والممارسة (15 فقرة) باستخدام أسئلة متعددة الاختيارات. جرى تحليل البيانات باستخدام
برنامج SPSS version 21

النتائج: بلغ متوسط درجة المعرفة 33.09٪، بينما بلغ متوسط درجة الممارسة 36.19٪، وكلاهما يُظهر مستوى منخفضًا. حقق الممرضون العاملون في أقسام العناية المركزة درجات أعلى بشكل ملحوظ مقارنة بزملائهم في الأقسام الطبية والجراحية. .($r = 0.442, p < 0.001$) وُجدت علاقة إيجابية متوسطة ذات دلالة إحصائية بين درجات المعرفة ودرجات الممارسة

المناقشة: تُشير النتائج إلى وجود نقص شائع في المعرفة والممارسة بين الممرضين، خصوصًا في الأقسام غير التابعة للعناية المركزة. تتوافق هذه النتائج مع أبحاث أُجريت في بيئات نامية أخرى وتُظهر قصورًا في برامج التدريب المعيارية. إن العلاقة .الإيجابية بين المعرفة والممارسة تدل على أن تعزيز التعليم يمكن أن يُحسن الأداء السريري

الاستنتاج: كشفت الدراسة عن وجود قصور في معرفة وممارسة الممرضين في مستشفيات شمال الضفة الغربية فيما يتعلق بنقل الدم، مما يُشكل مخاطر على سلامة المرضى. وتؤكد على الحاجة الفورية إلى التعليم المستمر والتدريب والتقييم الدوري .لتعزيز سلامة نقل الدم وتحسين النتائج السريرية

.الكلمات المفتاحية: المعرفة، الممارسة، نقل الدم