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Knowledge of Nurses, Attitudes and Practices Related to Blood Transfusion at the Neonatal and Pediatric Intensive Care Unit at University Hospital Mohammed VI Marrakech Morocco

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Blood transfusion is a therapeutic substitute, saving millions of lives each year.
This practice is common at the neonatal and pediatric intensive care levels.
In order to ensure transfusion safety, control of all stages of the transfusion chain is essential from the collection of blood, its preparation and its biological qualification to the completion of the transfusion procedure and even the follow-up of recipients.

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With this in mind, the purpose of this study is to describe the state of knowledge of nursing practice in the area of blood transfusion at the level of neonatal and pediatric intensive care unit at Mohammed VI University Hospital in Marrakech, based on a descriptive approach guided by a frame of reference from the literature review.
We collected our results based on an annotated questionnaire, we found that nurses who had already received specialized training in transfusion rules had a satisfactory level of knowledge compared to those who had not received any training For this we recommend through our survey the importance of continuing training of nursing staff.

Keywords: Nursing team; intensive care unit; blood transfusion; transfusion rules; practical knowledge; international guidelines.

1. INTRODUCTION

Blood transfusion is a therapeutic act of administering blood or one of its cellular or plasma components from one or more healthy subjects called “donors” to a sick subject called “recipient”, it is considered one of the most sensitive activities in a health system [1].

In Morocco, blood transfusion was marked after independence, along with the evolution of the national hospital network and scientific advances in blood transfusion. The history of TS in this country began in 1943 with the creation of the first Blood Transfusion Centre in Fez, then in Casablanca in 1948, and the creation of the National Blood Transfusion Centre in Rabat in 1956. In 1993, the national blood transfusion policy was implemented, with the creation of nearly 50 regional and local TS centres. (Ms. Salma BAHI, 2016a).

WHO recommends that each country put in place the necessary policies, systems and structures to ensure safety, the accessibility, quality and timely availability of blood and blood products to meet the needs of all patients requiring transfusion. These should be accompanied by legislation to promote consistency in both the application of standards and the quality and safety of blood and blood products [2].

However, in many countries, secure blood supplies are deficient and transfusion services are faced with the need to find enough blood while ensuring its quality and safety.

Blood transfusion helps save millions of lives every year. It helps improve the quality of life of patients with life-threatening conditions. It is used in complex medical and surgical procedures (WHO, 2021).

According to the French Blood Establishment in 2019 this practice is used in emergencies according to a percentage of 12%, in case of need of red blood cells according to a percentage of 80%, for hematological diseases or cancers according to a percentage of 46%, and finally in the case of surgical procedures according to a percentage of 34% [3]. In France, 500,000 people receive a blood cell every year, the French blood establishment collects and distributes 2.2 million pockets per year and receives 1.5 million donors from the population of giving age [4].

In low-income countries, up to 54% of HCWs are among children under five (WHO, 2022).

1.1 Objective

Descriptive study that aims to describe nursing knowledge, attitudes and practices regarding blood transfusion at the level of neonatal and pediatric intensive care unit of university hospital MOHAMED VI.

2. METHODS

This study is based on two data collection tools, carried out at university hospital Mohammed VI in Marrakech in particular at the level of neonatal and pediatric intensive care unit during the month of May 2022.

The neonatal intensive care unit included 29 nurses (5 midwives, 1 emergency room nurse, 1 mental health nurse, 22 general purpose nurses), while the pediatric intensive care unit included 17 (3 emergency room nurses, 1 anesthesia and resuscitation nurse, 1 physiotherapist, 12 multipurpose n urses).

3. RESULTS AND DISCUSSION

In this section, the main results of this study will be analysed and discussed.

Of the 30 questionnaires distributed to nursing staff practising at the level of neonatal intensive care unit and pediatric intensive care unit of the Mohammed VI university hospital in Marrakech, 30 were recovered, for a response rate of 100%.

3.1 Personal and Professional Characteristics

For caregivers, the female sex dominates with a percentage of 70% unlike the male sex which does not exceed 30%. Also, the nursing staff surveyed is relatively young at an age between 24 and 38 years, with seniority between 1 and 13 years. A study at the Moulay Ismail Military Hospital in Meknes confirmed that a good knowledge of blood transfusion was found in health workers with more than ten years of practice, and insufficient among those with less than ten years of experience. (Ms KHAOULA ABDELLAOUI, 2018).

In addition, 68% are general nurses, 18% are midwives, and 7% are anesthesia and resuscitation and emergency and intensive care nurses.

Table 1. Personal and professional characteristics

Personal and Professional Characteristics	Percentage
Sex	Female sex 70%
Age	Age between 24 and 38 years
Length of medical practice	Health workers with more than ten years
Type of speciality	68%: nurses 18%: midwives 7%: anesthesia and intensive care nurse

3.2 Basic Training

This study reveals that the majority of caregivers 63% report that they have not received in-service training, compared to 37% who have. According to a study by Mr. Lataief, 2005), show that 58% of the respondents did not receive training on transfusion safety during all working years. Of the remaining 42%, 19% had received training in the form of a meeting at the service of which they are employed. Training via newsletter in 6.8% and 6.7% through basic training, and only 3.8% of people benefited from continuing training, so it did not exceed 16% according to (Ms. KHAOULA ABDELLAOUI, 2018).

Continuing education remains one of the essential tools for the development and promotion of activities at all levels of the transfusion chain.

Table 2. Percentage of personal trained

Personal trained	37%
Personal not trained	63%

3.3 General Knowledge of Nurses

Our study shows that a large majority of staff (93.3%) confirm that the mandatory examination before any transfusion of blood cells is Group ABO determinations, as well as approving that the elements that must accompany the prescription of blood cells are the results of the 2 blood group and irregular agglutinins [RAI] determinations (76.6%) and a statement of 70% for the transfusion record.

According to a study at university hospital Fattouma-Bourguiba de Monastir, Tunisia 13.8% of staff had given the exact answer regarding pre-transfusion tests and samples to be requested when prescribing a blood cell unit (Ms. KHAOULA ABDELLAOUI, 2018). On the other hand, Le Cosquer, in 2000, found that the blood count was the least performed biological examination (6.7%), with 50.9% of nurses not performing the labelling immediately after the sample was taken and in the patient's bed. According to the Montsouris Institute, verification of identity is essential during a transfusion (Bracelet Check).

Table 3. General knowledge of nurses

Examination before any transfusion of blood cells	93,3%
Verification of the ABO group and medical prescription	76,6%
Declaration in the transfusion file	70%

Another study at the Bamako and Kati CHU on the level of knowledge of the staff interviewed had not received training on blood transfusion. Knowledge of blood transfusion was inadequate in 37.6% and unknown in 30.3% of cases. The basics of blood products, their indications and the accidents associated with their use were not sufficiently mastered. Knowledge of what to do in the event of a transfusion accident was good in 42.9% of cases [5].

In the same sense, a study carried out at the level of two Sousse CHU by Lataief in 2005,

shows that only 13.8% of staff gave the exact answers regarding the pre-transfusion tests and samples to be requested when prescribing a blood cell unit, 28% of respondents were aware of the time limit that should not be exceeded upon receipt of BP, 59% of respondents gave correct answers regarding the method of blood collection for ultimate control. 34% of respondents knew the clinical signs of a transfusion accident [6].

Otherwise a study at the Hematology and Oncology Center on the rules and measures governing the transfusion procedure. Shows that only 40% of nurses have had blood transfusion training, 70% of them master the main rules of verification and documentation of transfusion, while only 65% meet the proper storage conditions for labile blood products. Adequate management of transfusion incidents was only achieved by 40% of nurses surveyed [7].

3.4 Blood Type Systems

Based on the data received, 66.7% of staff confirmed that Group A subjects, red blood cell antigens are Ag A and the majority of staff (66.6%) reported Ag B in Group B, and for Group O, a percentage of 63.3% of staff responded that none of the antigens are carried by red blood cells, while in Group O, only 33.3% of staff responded with Ag A and B.

A strong total of 73.3% approves that in a group A subject, the antibody present in the plasma is the B antibody with an identical percentage of 73.3% for the B antibody in a group A subject that converges the statement of (Doctissimo, 2022) the subject belongs to group A, his serum contains antibodies directed against the antigen B. So we cannot transfuse blood type B or AB under pain of seeing hemolysis (destruction of red blood cells) and transfusion shock. A person in Group B cannot be transfused with Group A blood because they have anti-anticorps A. People in Group AB with both antigens on their red blood cells may receive Group A or Group B blood. They are known as universal recipients. They have neither anti-A nor anti-B antibodies in their serum. However, they can only give blood to AB subjects. Group O subjects do not carry AB antigen on their red blood cells. They are universal donors.

3.5 General Conditions of Acceptance

According to the opinions of the nurses interviewed, a percentage of 73.3% confirms that specific equipment is used for the transport of blood cells, with almost all 76.7% that they adopt a protocol when receiving these, as well as a 60% report indicating that the checks are carried out by the nurse alone and not by the nurse and doctor, while 50% of the nurses question the verification of the transport time when receiving the package, with a percentage of 40% of staff that they refused to verify the concordance between the prescription and the quality of the products issued upon receipt of the packaging. This is consistent with the fact that the nurse must check at the time of receipt in the presence of the carrier: the destination of the package: identification of the recipient and the sender-the conformity of the delivery: appearance of the package, conformity of the transport (time, temperature, hygiene)-conformity of products: number, nature, qualifications and group according to medical prescription-Integrity and expiry date-Conformity of documents: presence of all documents (medical prescription, issue card, blood group card, irregular agglutinins)-correspondence of the patient's identity between the medical prescription and the issue record(s) according to (Dr. Nicole Catherine, 2016).

Table 4. Blood type systems

Blood type	Percentage
Groupe A	66,7%
Groupe B	66,6%
Groupe AB	63,3%
Groupe O	33,3%

Table 5. General conditions of acceptance

Specific Equipment	73,3%
Protocol when Receiving blood	76,7%
The Verification of the transport by nurse alone	50%
Nurses that denied checking the concordance between the prescription and the quality of the products	40%

From the above, the choice of theme will clearly show: the state of knowledge of nurses, the importance of respect for good transfusion practices, the reduction of the risk of accidents, the continuous improvement of transfusion safety. This imposes the importance of strengthening the training programme in blood transfusion, taking into account transfusion safety during continuing training sessions and the need to master the specificities related to the new-born and infant up to 3 months.
[8-11]

According to the WHO, the nurse is the person who has received basic nursing education, is able and empowered to ensure in his country the responsibility for all the nursing care required for the promotion of health, the prevention of disease and the care of the sick (2]. and according to Moroccan Dahir n°1-57-003 (February 1960), any person who usually gives at home or in private hospital, prevention or consultation is considered to be a nurse, care prescribed or advised by a doctor. (Moroccan Dahir: Regulation Le Port Du Titre and the practice of nursing) The knowledge and practices of nursing staff in transfusion settings are fundamental to ensuring the safety of transfusion patients and the quality of care [12].

3.6 Temporary Storage of Labile Blood Products in the Care Unit

The nurses note that 43.3% of the staff deny the fact of keeping the plasma in the unit more than 6h as well as 30% of them declare that the plasma should not be thawed before delivery. According to the regulation concerning the therapeutic use of WHP transfusions according to ("Agence Nationale d'Accreditation et d'Evaluation en Santé (ANAES)," 1998), the products must be maintained under the conditions and according to the shelf life imposed by the characteristics of the blood cells. These parameters vary by blood cells and appear on the label of each product. The storage of the product(s) outside a blood cells repository is prohibited in the care unit beyond the six hours between the attribution of the product and the transfusion procedure, except for surgical procedures lasting longer than six hours, and platelets and thawed plasma must be transfused immediately upon receipt.

3.7 The Transfusion Procedure

Our study shows that 23.3% of staff deny that the doctor should intervene at any time during the transfusion process. The transfusion procedure is a medical procedure which may be delegated, on medical prescription, to midwives or nurses, provided that a doctor can intervene at any time, This contrasts a study done in 2018 that insists that the doctor is responsible for the transfusion he prescribes and that he delegates the realization, he must ensure that the person to whom he is delegating the act is competent to perform it and give him his contact information so that he can contact him in case of a problem during the transfusion, 50% of staff do not confirm that among the equipment needed for transfusion of each blood cells is the ultimate control device ABO [13-15].

Table 6. Temporary storage of labile blood products in the care unit

Keeping the Plasma in the unit more than 6 hours	Nurse's response
Yes	43,3%
No	30%

Table 7. The transfusion procedure

The doctor should intervene at any time during the transfusion	23,3% of staff says no
The equipment needed for transfusion is the ultimate control device ABO	50% of staff do not confirm

Transfusion safety is an ongoing concern inherent in the biological nature of the product, it is based on three essential elements: microbiological safety, immunological safety which is essentially aimed at mitigating immediate infectious risks, and the transmission of pathogenic microbes and clinical safety based on strict indications and surveillance procedures.

The indications for transfusion of blood products are increasingly codified, based on recommendations drawn up by experts, either through the exploitation of publications from journals of recognised value or through the pooling of their own experience. The adverse effects of blood transfusion are numerous and have justified the establishment of a dedicated vigilance system [16].

Hemovigilance, which is based on a more rigorous, rational and systematic approach to transfusion safety, makes it possible to recognize, identify, document and monitor transfusion accidents and thus to develop active prevention [16].

In transfusion medicine, a child under four months of age is considered a newborn. Newborns are subject to more restricted pre-transfusion testing than older infants, children and adults (Thimou et al. 2000a).

Medical and allied health professionals may have a lack of knowledge, practice and training which may explain some of the dysfunctions observed during transfusion therapy. A solid knowledge of immunological principles and haematological and physiological particularities specific to the

newborn of blood transfusion and compliance with transfusion safety rules are essential for good practice [17].

In Tunisia, a study was carried out to evaluate the knowledge and practices of health care providers regarding transfusion safety, and transfusion medicine care shows that 58% of those surveyed did not receive training on transfusion safety during all working years. Of the remaining 42%, 19% had received training in the form of service meetings. Training via newsletter in 68% of cases. And 6.7% through basic initial training. Only 3.8% of those surveyed had received in-service training [6].

3.8 Administration of Labile Blood Products and Monitoring

According to our study 13.3% of staff can transfuse if the final check has already been done by another nurse, while for the duration of the blood cell transfusion which varies from 20 to 30 minutes, only 36.7% of staff could confirm. 26.6% of employees indicate that they must stay with the patient for at least 15 minutes.

The ultimate ABO control in the patient's bed is mandatory by the nurse who will perform the transfusion, including in the event of a life-threatening emergency.

It must include: verifying the match: between the identity of the recipient and what is mentioned on the blood type document: surname, given names, date of birth, and between the blood groups indicated on this card and on the label of the unit of labile blood product to be transfused, with a specific duration for each type of blood group that must be respected, and follow-up should be done by the nurse under the control of the transfusion physician. [18,19]

The surveillance of the transfusion procedure must be attentive and continuous for the first 15 minutes, then regular during the transfusion and within hours after the end of the transfusion. Monitoring parameters are recorded in the patient record. ("National Agency for Accreditation and Evaluation in Health (ANAES)", 1998)

According to literature reviews, the transfusion of labile blood products complies with strict rules of good practice. These rules involve methods of collecting blood donations, the biological qualification of blood products and the modalities of their use. [20,21]

Table 8. Administration of labile blood products and monitoring

Staff can transfuse if the final check has already been done by another nurse	13,3%
The duration of the blood cell	36,7%
Patient monitoring for the first 15 minutes	26,6%

The blood, collected in the form of specific apheresis or total blood samples, is systematically leukocyted and then divided into its different components in order to obtain the different labile blood products: concentrated red blood cells, platelet concentrates or therapeutic plasma.

Labile blood products sometimes pose difficult compatibility problems related to the diversity of the antigenic systems that the blood cells carry on their surface and the immune responses that their introduction through the blood can trigger in the recipient [22].

3.9 Special Features of the Newborn

Our study shows that a large majority of staff 70% will transfuse in an emergency neonates with a group O rhesus negative blood cell unit, In contrast, only 40% of staff reported that blood consistent with the blood of the newborn and its mother was used to transfuse the blood cell in a newborn aged 0 to 3 months [23-25].

Table 9. Special features of the newborn

The practice of transfusion in a new born	70%
Transfusion rules from birth to 3 months	40%

This is in line with the regulations concerning the therapeutic use of blood transfusions of labile products, transfusions must be compatible with the blood of the mother and the child: it is essential to have immunological information Hematology of the mother (ABO Rh D (RH1), phenotype Rh Kell, RAI) [26,27].

In case of repeated transfusion, it is recommended to limit the number of donors by preparing several bags from the same donation and reserving them for the same child. Based on ("Agence Nationale d'Accreditation et d'Evaluation en Santé (ANAES)," 1998)

At the level of the neonatology and neonatal intensive care unit at Hospitalo-University Mother-Child Hospital of Tlemcen (E.H.S) between 2014 and 2015, 3.46% of newborns were transfused. Premature babies accounted for 41% of all transfused newborns. Eighty-eight per cent of transfusions were made in the first week of life, with the red blood cell unit being the most widely used labile blood product followed by the fresh frozen plasma and platelet unit. Twenty-seven newborns (36.98%) received more than one transfusion [28].

4. CONCLUSION

Blood transfusion is common in neonatology, but presents immunological and infectious risks. Reducing this risk requires a perfect knowledge of the hematological particularities specific to the newborn and a particular rigor in the nurse occupies a central place in this process, its role consists on the one hand, by identifying the errors that occurred upstream during pre-transfusion checks and on the other hand, preventing adverse reactions by ensuring that procedures are followed and that the transfused patient is closely monitored.

The study we conducted allowed us to identify several anomalies concerning the knowledge and practical management of an act of care often trivialized by health professionals and whose consequences of a bad realization are sometimes nefastes, this confirms the interest of organization of the continuing training for the caregivers.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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