

## Original Research Article

### **Evaluation of Nursing knowledge, attitudes and practices related to blood transfusion at the neonatal and pediatric intensive care unit at university hospital Mohammed VI Marrakech Morocco.**

#### **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. 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. **Please include study design, statistical analysis or tool used, conclusion and probably recommendations.**

#### **KEY WORDS:**

Nursing team, intensive care unit, blood transfusion, transfusion rules, practical knowledge, international guidelines.

#### **INTRODUCTION:** please carry out a plagiarism check on your work.

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. (Masson, 2010).

The use of this blood transfusion is common in the newborn mainly in the premature. Among the pathologies requiring the most transfusions are first hematological and cancer diseases. In addition, preterm anemia is due to lack of reserves, shorter life of red blood cells, rapid staturo-weight growth and inadequate production of erythropoietin. It is aggravated most often following a blood spoliation by multiple samples.

Moreover, in newborns and infants up to the age of 3 months the immunological rules that ensure transfusion safety are different from those applied to the larger child and the adult, these rules are based on age-specific physiological and immunological bases. (Thimou et al., 2000a)

About 40% of newborns weighing between 1000 and 1500 g at birth and 90% of those weighing <1000 g can receive an average of five red blood cell transfusions during their hospital stay. (Natasha Ali, 2018) ; (Whyte & Jefferies, 2014)

Used correctly, can save lives and improve health (M. Chobli 2011, n.d.). However, like any therapeutic intervention, transfusion can lead to immediate or delayed complications and a risk of transmission of infectious agents. (Ms. Salma BAH, 2016a)

## **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.

## **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 nurses).

**1. Discussion of results:** this capture is not necessary. table should accompany each results interpretation.

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 (at instead) the Mohammed VI university hospital in Marrakech, 30 were recovered, for a response rate of 100%.

**Result 1. Personal and professional characteristics:** followed by table 1 presenting the result

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.

**Result 2. Basic Training:** followed by table 2 presenting the result

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

**Result 3. General knowledge of nurses:** followed by table 3 presenting the result

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 RAI (write out in full before the use of abbreviation) 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).

#### **Result 4. Blood type systems: followed by table 4 presenting the result**

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 the staff responded with none of the antigens is carried by the red blood cells, while in a group O only 33.3% of the staff responded by Ag A and B.

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

#### **Result 5. General conditions of acceptance: followed by table 5 presenting the result**

According to the opinions of the nurses interviewed, a percentage of 73.3% confirm 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 that the checks are carried out by the nurse alone and not the nurse and the doctor, while 50% of the nurses question the verification of the transport time when the package is received, with a percentage of 40% of the staff that they denied checking the concordance between the prescription and the quality of the products issued upon receipt of the package. 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 shipper- the conformity of the delivery: appearance of the package, conformity of the transport (time, temperature, hygiene)- conformity of products: number, nature, qualifications and group in accordance with the medical prescription- Integrity and expiry date- Conformity of documents: presence of all documents (medical prescription, issue sheet, blood grouping card, RAI)- patient identity match between the medical prescription and the issue record(s) according to (Dr. Nicole Catherine, 2016)

#### **Result 6. Temporary storage of labile blood products in the care unit: followed by table 6 presenting the result**

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.

**Result 7. The transfusion procedure followed by table 7 presenting the result**

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.

**Result 8. Administration of labile blood products and monitoring: followed by table 8 presenting the result**

13.3% of staff can transfuse if the ultimate check has already been performed by another nurse, while for the duration of blood cell transfusion which ranges from 20 to 30 minutes, only 36.7% of staff who could confirm. A percentage of 26.6% of staff report that they must stay with the patient for at least 15 minutes.

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

It must include: checking the concordance: between the identity of the recipient and what is mentioned on the blood group document: surname, given names, date of birth, and between the blood groups indicated on this card and on the label of the WHP unit to be transfused, with a specific duration for each type of Blood group that must be respected, and monitoring must be done by the nurse under the control of the doctor responsible for the transfusion. The surveillance of the transfusion procedure must be attentive and continuous for the first 15 minutes, then regular during the transfusion and in the hours following the end of the transfusion. The monitoring parameters are noted in the patient file. ("Agence Nationale d'Accreditation et d'Evaluation en Santé (ANAES)," 1998)

**Result 9. Special features of the newborn: followed by table 9 presenting the result**

Our study shows that a large majority of staff 70% will transfuse in an emergency neonates with a non-hazardous 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.

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).

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)

**DISCUSSION (The whole of the discussion should be moved to introduction). Discussion is base on your findings in comparison with other researchers pointed out in your introduction with reasons why it is so. Hence rediscuss your results.**

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%. (French Blood Institution, 2021) 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. (M. MOUNTAGA TALL, 2008).

In low-income countries, up to 54% of HCWs are among children under five. (WHO, 2022). 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 (Nehari Khalil; BoukhnazerOussama, 2015a).

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 (CTS) in Fez, then in Casablanca in 1948, and the creation of the National Blood Transfusion Centre (CNTS) 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. (World Health Organization, 2016)

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.

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.

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.

The diversity of physiological or immunological situations encountered raises problems which may be common to the different labile or individual blood products, inherent, for many, group systems of transfused cells or antibodies contained in plasma.

It is thus that, for each blood component, there is a wide variety of therapeutic forms that corresponds to particular qualifications related to particular examinations: phenotype, compatibilized, negative for cytomegalovirus serology, changes in the original product (Jean-Yves Mulle, 2003)

The deletion of blood cells has been systematic in France since 1 April 1998. This measure brings a number of clearly demonstrated benefits, including the reduction of the risk of allo-immunization anti-Human leukocyte antigen (HLA), and other putative ones including the reduction of post-transfusion immunomodulation. (Jean-Yves Mulle, 2003)

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. (Jean-Yves Mulle, 2003)

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. (Jean-Yves Mulle, 2003)

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)

Indeed, The dedicated donation, or single donor protocol, is only recommended in premature newborns for which blood cell transfusions of less than 20 ml/kg repeated are planned, within a period not exceeding 28 days. (High health authority, 2014)

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.

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. (World Health Organization, 1966) 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. (Foued Ben Salem, 2005)

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. (Nadège GROLLEAU, 2015)

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. (foued Ben Salem -, 2005a)

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. (M. Diakité, 2012)

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. (foued Ben Salem -, 2005b) 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 (FZ Lahlimi, 2014)

## **CONCLUSION**

Blood transfusion is common in neonatology but with both immunological and infectious risk. 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, his role consists on the one hand, in identifying the errors that occurred upstream during the pre-transfusion checks and on the other hand, prevent adverse reactions by ensuring that procedures are followed and that the transfused patient is closely monitored. The study we conducted allowed us to pinpoint several anomalies concerning the knowledge and practical management of an act of care often trivialized by health professionals and whose consequences of a bad achievement are sometimes harmful. **Recommendation if any.**

## **REFERENCES :itshouldbearranged in line with the journal rules**

1. Regional Health Agency. “Hemovigilance and Transfusion Safety”, 2019. <https://www.paca.ars.sante.fr/hemovigilance-et-securite-transfusionnelle-2>. Moroccan Dahir: regulation concerning the wearing of the title and the practice of the nursing profession, Pub. L. No. 2470, 1-57-008 1960 (s. d.).
2. Fortin, Marie-Fabienne, and Johanne Gagnon. Foundations and stages of the research process: quantitative and qualitative methods. Montreal: Chenelière Education, 2010.
3. Foundations and stages of the research process: quantitative and qualitative methods. Montréal: Chenelièreéducation. 2010.
4. Foued Ben Salem. “(PDF) Knowledge and Practices of Health Care Providers in Transfusion Safety,” 2005. [https://www.academia.edu/8209640/Connaissances\\_et\\_pratiques\\_du\\_personnel\\_soignant\\_en\\_mati%C3%A8re\\_de\\_s%C3%A9curit%C3%A9\\_transfusionnelle](https://www.academia.edu/8209640/Connaissances_et_pratiques_du_personnel_soignant_en_mati%C3%A8re_de_s%C3%A9curit%C3%A9_transfusionnelle).

5. Knowledge and Practices of Health Care Providers in Transfusion Safety | - ». 2005, 2022. [https://www.academia.edu/8209640/Connaissances\\_et\\_pratiques\\_du\\_personnel\\_soignant\\_en\\_mati%C3%A8re\\_de\\_s%C3%A9curit%C3%A9\\_transfusionnelle](https://www.academia.edu/8209640/Connaissances_et_pratiques_du_personnel_soignant_en_mati%C3%A8re_de_s%C3%A9curit%C3%A9_transfusionnelle).
6. Foued Ben Salem -. (PDF) Knowledge and Practices of Health Care Providers in Transfusion Safety, 2005. [https://www.academia.edu/8209640/Connaissances\\_et\\_pratiques\\_du\\_personnel\\_soignant\\_en\\_mati%C3%A8re\\_de\\_s%C3%A9curit%C3%A9\\_transfusionnelle](https://www.academia.edu/8209640/Connaissances_et_pratiques_du_personnel_soignant_en_mati%C3%A8re_de_s%C3%A9curit%C3%A9_transfusionnelle).
7. Knowledge and Practices of Health Care Providers in Transfusion Safety”, 2005. [https://www.academia.edu/8209640/Connaissances\\_et\\_pratiques\\_du\\_personnel\\_soignant\\_en\\_mati%C3%A8re\\_de\\_s%C3%A9curit%C3%A9\\_transfusionnelle](https://www.academia.edu/8209640/Connaissances_et_pratiques_du_personnel_soignant_en_mati%C3%A8re_de_s%C3%A9curit%C3%A9_transfusionnelle).
8. FZ Lahlimi. «Evaluation of transfusion practice: survey within the nurses of the oncology-hematology center of CHU Mohammed VI in Marrakech, Morocco». Faculty of Medicine and Pharmacy Marrakech, 2014. <https://www.em-consulte.com/article/960584/evaluation-de-la-pratique-transfusion-enquet>.
9. High Health Authority. “Red Blood Transfusion homologues - neonatologie - fiche de synthèse.pdf” november 2014.
10. Jean-Yves Mulle. “Blood transfusion: labile blood products.” EM-Consult, 2003. <https://www.em-consulte.com/>.
11. French Blood Establishment. “Répondre aux urgences et soins les malades quotidiens.” French Blood Establishment, November 2021. <https://dondesang.efs.sante.fr/articles/repondre-aux-urgences-et-soigner-les-malades-quotidiennement>.
12. M. Chobli 2011. “M. Chobli, la transfusion sanguine en Afrique”, s. d., 71.
- Diakité. “Knowledge and attitudes of medical personnel regarding blood transfusion in Mali.” Faculty of Medicine, Pharmacy and Dentistry (FMPOS), University of Bamako, BP 1805, Bamako, Mali, 2012. <https://www.em-consulte.com/article/712358/connaissances-et-attitudes-du-personnel-medical-en>.
14. M. MOUNTAGA TALL. “BLOOD SUPPLY AT THE SOMINE DOLO HOSPITAL IN MOPTI.” The Faculty of Medicine, Pharmacy and Dentistry, 2008.
15. Ms Majda MOUTAHIR. “Viral safety in blood transfusion.” Faculty of Medicine and Pharmacy rabat, 2019.
16. Masson, Elsevier. “History of blood transfusion: The first blood transfusions in France (1667–1668) Elsevier Masson SAS, Transfusion Clinique et Biologique 17 (2010) 205–217.” In EM-Consulte, 2010. <https://www.em-consulte.com/article/270497/en-france-166>.
17. “Neonatal medicine: what is neonatal medicine?” , 17 June 2022. <https://www.passeportsante.net/en/specialites->

17. Ministry of Health. "CHU", 17 June 2022. [https://www.sante.gov.ma/Pages/Org%20sous-tutelle/CHU.aspx#:~:text=Il%20est%20soumis%20%C3%A0%20la,I%20\(15%20janvier%201983\).](https://www.sante.gov.ma/Pages/Org%20sous-tutelle/CHU.aspx#:~:text=Il%20est%20soumis%20%C3%A0%20la,I%20(15%20janvier%201983).)

18. "Transfusion Safety." N. Zmouli. 2014. <https://www.em-consulte.com/article/932961/safete-transfusion>.

19. "Evaluation of transfusion knowledge of midwives in public and private maternity hospitals in the Brittany region in 2014." Nadège GROLLEAU. *Transfusion Clinique et Biologique* 22, no. 5-6 (October 2015): 318-25. <https://doi.org/10.1016/j.tracli.2015.09.001>.

20. "Red Blood Cell Transfusion in Infants and Children - Current Perspectives." Natasha Ali. *Pediatrics and Neonatology* 59, no. 3 (June 2018): 227-30. <https://doi.org/10.1016/j.pedneo.2017.10.002>.

21. Nehari Khalil; BoukhazerOussama. "Practical-transfusion-in-the-new-born.pdf". Graduate thesis, Tlemcen Medical School «Dr.BenzerdjebBenaouda» Department of Medicine, 2015.

22. OMS. "Blood Donations and Transfusion Safety," June 1, 2022. <https://www.who.int/en/news-room/fact-sheets/detail/blood-safety-and-availability>. "World Blood Donor Day", June 14, 2021. <https://www.who.int/fr/campaigns/world-blood-donor-day/2021>.

23. "Clinical Transfusion Process and Patient Safety," 2010.

24. World Health Organization. "WHO Committee of Nursing Experts," 1966. "World Blood Donor Day 2016", 2016.

25. Canadian Blood Services. "Transfusion Practices in Newborns and Children." Professional Education, August 2, 2017. <https://professionaleducation.blood.ca/fr/transfusion/guide-clinique/pratiques-transfusionnelles-chez-le-nouveau-ne-et-lenfant>.

26. "Transfusion Practices in Newborns and Children". Professional Education, 2 August 2017. <https://professionaleducation.blood.ca/fr/transfusion/guide-clinique/pratiques-transfusionnelles-chez-le-nouveau-ne-et-lenfant>