

# Assessment of Unmet Transfusion Needs in the Management of Immediate Postpartum Haemorrhage at the Kalaban Coro Reference Health Centre (MALI)

Bocary Sidi Kone<sup>1,2\*</sup>, Kalifa Traore<sup>1,2</sup>, Mahamoudou Coulibaly<sup>2,3</sup>, Cheickna Sylla<sup>2,4</sup>, Sema Keita<sup>2,5</sup>, Yacouba Sylla<sup>2,6</sup>, Mamadou Haïdara<sup>2,3</sup>, Mahamadou Keita<sup>2,7</sup>, Sékou Bakary Keita<sup>1,2</sup>, Bamba Brehima<sup>2,3</sup>, Mamadou Kampo<sup>8</sup>, Dramane Fomba<sup>2,7</sup>, Yacouba Aba Coulibaly<sup>2,4</sup>, Seydou Z. Dao<sup>2,9</sup>, Modibo Dicko<sup>2,6</sup>

<sup>1</sup>Department of Gynecology and Obstetrics, Polyclinique Mère Enfant Mohamed VI, Bamako, Mali

<sup>2</sup>Department of Gynecology and Obstetrics, National Centre for Scientific and Technological Research, Bamako, Mali

<sup>3</sup>Department of Gynecology and Obstetrics, Kalaban Coro Reference Health Centre, Bamako, Mali

<sup>4</sup>Department of Gynecology and Obstetrics, Centre Hospitalo-Universitaire Gabriel Touré de Bamako, Bamako, Mali

<sup>5</sup>Department of Gynecology and Obstetrics, Fana Reference Health Centre, Koulikoro, Mali

<sup>6</sup>Department of Gynecology and Obstetrics, Reference Health Centre of Commune II of the District of Bamako, Bamako, Mali

<sup>7</sup>Department of Gynecology and Obstetrics, Reference Health Centre of Commune I of the District of Bamako, Bamako, Mali

<sup>8</sup>Department of Gynecology and Obstetrics, Timbuktu Hospital, Timbuktu, Mali

<sup>9</sup>Department of gynecology and Obstetrics, Reference Health Centre of Commune VI of the District of Bamako, Bamako, Mali

Email: \*bocarysidi45kone@yahoo.fr, scheickylla@yahoo.fr

**How to cite this paper:** Kone, B.S., Traore, K., Coulibaly, M., Sylla, C., Keita, S., Sylla, Y., Haïdara, M., Keita, M., Keita, S.B., Brehima, B., Kampo, M., Fomba, D., Coulibaly, Y.A., Dao, S.Z. and Dicko, M. (2023) Assessment of Unmet Transfusion Needs in the Management of Immediate Postpartum Haemorrhage at the Kalaban Coro Reference Health Centre (MALI). *Open Journal of Obstetrics and Gynecology*, 13, 1645-1657. <https://doi.org/10.4236/ojog.2023.139138>

**Received:** August 10, 2023

**Accepted:** September 25, 2023

**Published:** September 28, 2023

## Abstract

The aim was to assess transfusion needs in the management of immediate postpartum haemorrhage. **Materials and Methods:** this was a prospective, descriptive, analytical study from 01 January 2018 to 31 October 2018 in the gynecology and obstetrics department of the reference health center of Kalaban-Coro (Mali). **Results:** During the study period we recorded 32 cases of transfusion of the immediate postpartum out of 109 cases of hemorrhage or 29.35%; for a total of 2425 deliveries or a frequency of 1.31%. The main indications for blood transfusion were: postpartum haemorrhage due to tearing of the soft parts in 21.9%; retroplacental hematoma in 18.6%; uterine rupture in 12.5%; and placenta previa covering hemorrhagic in 12.5%. More than half of the transfused were evacuees, or 62.5%. Unmet transfusion requirements were 59.4%. The blood products requested were: whole blood in 99% of cases and fresh frozen plasma in only 1% of cases. **Conclusion:** the need for labile blood products remains a reality in obstetrics. The permanent availability of labile blood products improves the prognosis of immediate postpartum haemorrhages.



---

## Keywords

Blood Transfusion, Postpartum Hemorrhage

---

## 1. Introduction

Blood transfusion (TS) consists of venous passage of blood or one of its cellular or plasma components from one or more subjects called “donor” to a sick subject called “recipient” TS poses a risk of acute or delayed complications and transmission of infection [1]. According to the WHO, 5% to 10% of HIV infections worldwide are transmitted by TS or contaminated blood products. An even greater number of PSL recipients are infected with hepatitis B and C virus, syphilis treponema, and other infectious agents [2]. The logic of selective transfusion is to offer each blood product in the most suitable form in purity and concentration [3] on the basis of a principle which is: the patient should receive only the blood component he needs. The clinical audit is an evaluation method that uses the criteria to compare care practices to accepted references in order to measure the quality of these practices and the results of care with the objective of improving them [4]. In France, several audits on TS were conducted, notably at the University Hospital Center (CHU) of Marseille [5]. In Africa, in 2001 during the 51st session of WHO held in Brazzaville, the Regional Committee adopted the Regional Strategy for Blood Safety whose aim is the formulation and implementation of national policies and plans. The concept of the audit is recent and difficult to implement, indeed two (2) studies were conducted in 2005 including one at the Treichville University Hospital in the gynecologic and obstetrics department in Côte d’Ivoire [6] and the other at the Fatouma Bourguiba University Hospital in Monaster in Tunisia [7]. Primary postpartum hemorrhage is conventionally defined as a loss of more than 500 ml of blood after vaginal delivery and greater than 1000 ml during caesarean section; occurring within 24 hours of delivery, from the genital tract [8]-[14]. All pregnant women are at risk of experiencing obstetric complications that more often lead to the use of a transfusion need, most of these complications can be fatal, present during pregnancy, childbirth, and or in the postpartum period. In obstetrics, haemorrhage is the leading cause of maternal mortality in developing countries. The WHO has estimated that each year worldwide at least more than half a million women die from obstetric complications. These same sources claim that 30% of deaths occur in Africa compared to 6000 deaths recorded in developed countries per year. In Mali, the maternal mortality rate is 368 deaths per 100,000 live births (EDSV). These obstetrical complications justify the numerous medical evacuations from a maternity ward to a better equipped centre.

## 2. Objectives

The aim was to assess unmet transfusion needs in the management of immediate

postpartum haemorrhage.

### 3. Materials and Methods

This was a prospective, descriptive, analytical study from 01 January 2018 to 31 October 2018 in the gynecology and obstetrics department of the reference health center of Kalaban-Coro (Mali).

**Study population:** The study population consisted of pregnant or immediate postpartum women admitted to the Kalaban Coro CSREF maternity ward during the study period in a context of bleeding or anaemia.

**Inclusion criteria:** This was any woman admitted to the obstetrics and gynaecology department for an obstetric cause that required blood transfusion in the immediate postpartum period. **Exclusion criteria:** Any pregnant or postpartum woman with no obstetric pathology requiring blood transfusion. **Data collection:** Data collection was done through individual questionnaires (survey sheets), supplemented by reading obstetric records, emergency records, delivery records, and the operative report register. **Analysis and data processing:** Data were entered and analyzed on the SPSS software 20. **The variables studied:** Several variables (age, socio-demographic characteristics, elements of the general and obstetrical examination; the outcome of pregnancy; the route of delivery; the transfusion done or not, the condition of the newborn at birth; the state of the mother at discharge) were measured and recoded according to different modalities of particular interest. The analysis of the data consists of three parts: the study of the overall frequency of the transfusion request, that of the satisfaction rate. The relative frequency of sociodemographic characteristics and certain obstetric characteristics (Gestivity, parity) was obtained by relating the number of transfusion needs of the class concerned to the total number of obstetric emergencies of the same class. Then we did an analysis of the indications for transfusion and a component on maternal and neonatal prognosis. The graphics were made on EXCELL office 2013. Cross-checking tables were produced. The Fisher exact test was used to investigate associations between qualitative variables. The materiality threshold was set at 5%. The averages of haemoglobin and the time taken between blood demand and availability were estimated. **Ethical analyses:** This work is purely scientific and concerns the audit of blood transfusion in the management of postpartum haemorrhage, which remains a worrying problem. No woman will be nominally mentioned in this work, guarantor of medical confidentiality. The informed consent of each woman was sought during the investigation [15]-[20].

### 4. Results

#### 4.1. Epidemiological Aspects

This study, which extended over a period of 10, allowed us to record 32 cases of immediate postpartum blood transfusion out of 109 cases of hemorrhage or 29.35%; for a total of 2425 deliveries or a frequency of 1.31%. The 19 to 30 age

group was the most represented at 59.4%. The Bambara ethnic group was the most represented with 40.6%. Housewives were the most frequent at 90.6%. Most of our patients were evacuated from the Cscm, *i.e.* 59.4%. Bleeding during pregnancy was the most common reason for admission at 28.1%. These epidemiological aspects are summarized in **Table 1**.

**Table 1.** Epidemiological aspects.

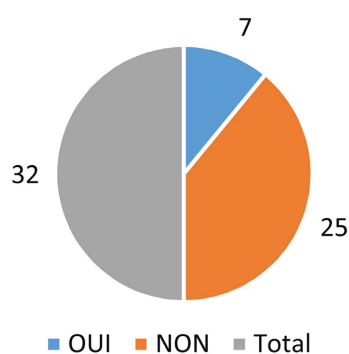
Age	Frequency	Percentage
<18	6	18.7
<b>19 - 30</b>	<b>19</b>	<b>59.4</b>
31 - 40	6	18.8
>41	1	3.1
<b>Ethnic group</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Bambara</b>	<b>13</b>	<b>40.6</b>
Sarakolé	2	6.3
Malinké	4	12.5
Fulani	4	12.5
Mianka	5	15.6
Senufo	2	6.3
Other	2	6.3
Profession	Frequency	Percentage
<b>Housewife</b>	<b>29</b>	<b>90.6</b>
Saleswoman	1	3.1
Pupil	1	3.1
Dressmaker	1	3.1
<b>Origin</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Evacuated</b>	<b>20</b>	<b>62.5</b>
Coming of themselves	12	37.5
<b>Reason for admission</b>	<b>Frequency</b>	<b>Percentage</b>
CUD	8	25.0
Large fetus with full dilation	1	3.1
Vulvar hematoma	1	3.1
HRP	1	3.1
HTA on pregnancy	2	6.3
Lack of effort Expulsive	1	3.1
Home birth	1	3.1
Oglio-amnios on transverse presentation	1	3.1
Preeclampsia	2	6.3
Cord process	1	3.1
<b>Bleeding on pregnancy</b>	<b>9</b>	<b>28.1</b>
Postpartum bleeding	2	6.3
Evacuated without plug	2	6.3

## 4.2. Clinical Aspects

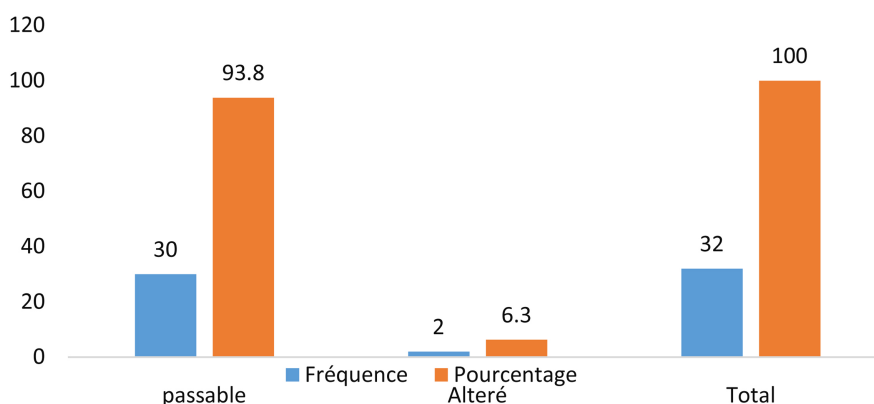
Primigestes were the most represented with 31.3%. The primiparous were represented mainly with 37.5%. High blood pressure was found in 4 patients or 12.4%. Tachycardia was found in 14 patients with 43.6%. Hyperthermia was found in 3 patients or 9.4%. NPC was not performed in 3 patients or 9.4%. More than 65.6% of NPCs were done by midwives. CPN 0 were the most represented risk factors at 21.9%.

Haemorrhage was of medium abundance in 26 cases or 81.3%. Group O rhesus positive was the most dominant at 37.5%. Caesarean section was represented in 4 cases or 12.5%. Whole blood was the most transfused in 32 cases or 97%. Three (3) bags were requested in 16 cases or 50%. One (1) bag was administered in 15 patients received 1 bag or 46.9%. The number of bags requested was not obtained in 19 cases or 59.4%. One (1) pocket was missing in 19 cases or 59.4%. The request for blood was made by gynecologists or 56.3%. More than 47.6% of the bags were obtained within a time interval < 30 mn. The tear of the soft parts was the most found cause at 21.9%. Some prepartum hemorrhages continued in the postpartum period of severe anemia hence blood transfusion

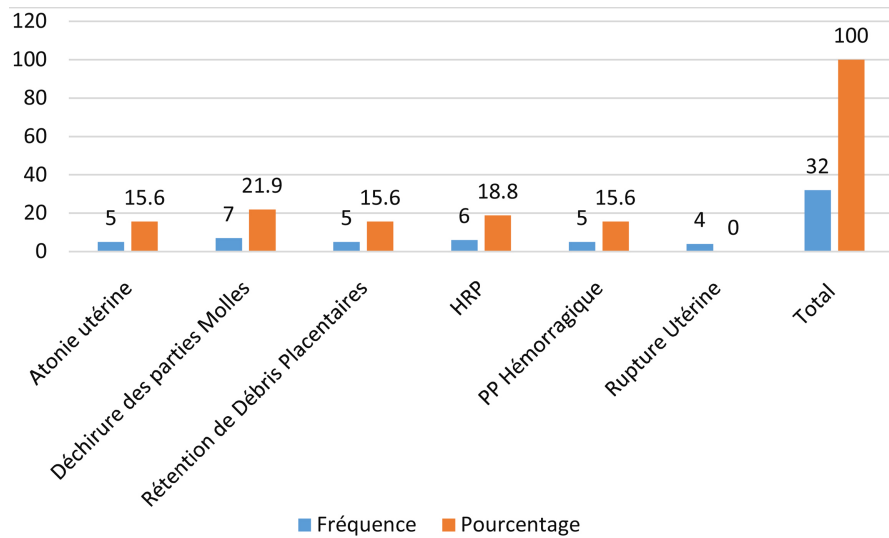
These clinical aspects are presented in **Table 2**, **Table 3** and **Figures 1-3**.



**Figure 1.** Distribution of patients by IMO presence seven (7) patients presented with OMI.



**Figure 2.** Distribution of patients by general condition two (2) patients had poor general condition (6.3%).



**Figure 3.** Distribution of patients according to the diagnosis retained.

### 4.3. Maternal-Fetal Prognosis

Respectively the NNEs (14) or 43.7% and (16) or 50% had an APGAR > 7 at 1' and at the 5'. The postpartum period was complicated in 5 patients or 15.6%. Postpartum endometritis was the most common complication in patients, at 12.5%. More than 18 of the patients had an Hb level < 7 g/dl or 56.25%. More than 93.75% of patients had an Hb level between 7 and 11. The duration of hospitalization 2 - 4 days was the most frequent length of stay at 84.3%. More than 93.8% of patients were in satisfactory condition at discharge. **Table 4** shows the information on maternal-fetal prognosis.

## 5. Discussion

### 5.1. Epidemiological Aspects

Out of a total of 109 cases of postpartum haemorrhage, we recorded 32 cases of immediate postpartum blood transfusion or 29.35%; for a total of 2425 deliveries or a frequency of 1.31%. This frequency of 29.35% of our study is lower than those of M Saye and Mariam L T [21]-[25] who found 93.8% and 99% respectively. This could be explained by the fact that this product was and still is the blood product available at the Csref mini blood bank in Kalaban Coro. One of the justifications for the frequent use of whole blood could be the great lack of knowledge among prescribers regarding the indication of blood derivatives (Red Blood Cell, platelet and fresh frozen plasma concentrates) that had been produced at the CNTS since 2006. In our study the age group 19 - 30 was the most frequent with 59.4% M Saye and M Ongoiba L H [20] [24] found in their study respectively 52.5% and 67.4%. It corresponds to the period when genital activity is most increased. Housewives were the most frequent with 90.6% this rate is higher than those of M Saye and M Ongoiba L H [20] [24] who found respectively 52.5% and 85.4%. This result shows us that the risk of using blood transfusion in the postpartum period is much more common among non-literate

**Table 2.** Detailed clinical aspects.

<b>Gestrity</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Primi gesture</b>	<b>10</b>	<b>31.3</b>
Pauci gesture	5	15.6
Multi gesture	7	21.9
Great multi gesture	10	31.3
<b>Parity</b>	<b>Frequency</b>	<b>Percentage</b>
Nulliparous	9	28.1
<b>Primiparous</b>	<b>12</b>	<b>37.5</b>
Multiparous	6	18.8
Large Multiparous	5	15.6
<b>TA (cmhg)</b>	<b>Frequency</b>	<b>Percentage</b>
6/4 - 10/8	7	40.5
11/8 - 13/8	21	47.1
<b>&gt;14/9</b>	<b>4</b>	<b>12.4</b>
<b>Pulse</b>	<b>Frequency</b>	<b>Percentage</b>
<100	18	56.4
<b>&gt;100</b>	<b>14</b>	<b>43.6</b>
<b>Temperature</b>	<b>Frequency</b>	<b>Percentage</b>
<37	24	90.6
<b>&gt;38</b>	<b>3</b>	<b>9.4</b>
<b>NPC</b>	<b>Frequency</b>	<b>Percentage</b>
1 - 3 CPN	26	81.2
>4 CPN	3	9.4
<b>CPN = 0</b>	<b>3</b>	<b>9.4</b>
<b>Risk factors</b>	<b>Frequency</b>	<b>Percentage</b>
Twins	2	6.3
Cicatricial uterus	4	12.5
<b>CPN = 0</b>	<b>7</b>	<b>21.9</b>
HTA	2	6.3
Greater multiparity	1	3.1
NO	16	49.9

women; this is often explained by home birth because of their unfavourable socio-economic conditions, on the one hand, and incorrect follow-up during pregnancy on the other.

## 5.2. Clinical Aspects

**Concerning the admission method:** nineteen (19) patients were evacuated or

**Table 3.** Clinical aspects following.

<b>The abundance of hemorrhage</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Average</b>	<b>26</b>	<b>81.3</b>
Abundant	6	18.8
Total	32	100%
<b>Rhesus grouping</b>	<b>Frequency</b>	<b>Percentage</b>
AB Positive	1	3.1
A Positive	9	28.1
B Positive	10	31.3
<b>O Positive</b>	<b>12</b>	<b>37.5</b>
<b>Birthing route</b>	<b>Frequency</b>	<b>Percentage</b>
Low Way	24	75.0
<b>Caesarean section</b>	<b>4</b>	<b>12.5</b>
Laparotomy	4	12.5
<b>Transfused blood</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Whole blood</b>	<b>32</b>	<b>97</b>
PFC	1	3
<b>Number of Bags Requested</b>	<b>Frequency</b>	<b>Percentage</b>
1	4	12.5
2	11	34.4
<b>3</b>	<b>16</b>	<b>50.0</b>
4	1	3.1
<b>Number of units transfused</b>	<b>Frequency</b>	<b>Percentage</b>
<b>1</b>	<b>15</b>	<b>46.9</b>
2	14	43.8
3	2	6.3
4	1	3.1
<b>Meeting the need for transfusion</b>	<b>Frequency</b>	<b>Percentage</b>
YES	13	40.6
<b>NO</b>	<b>19</b>	<b>59.4</b>
<b>Uncovered need for blood</b>	<b>Frequency</b>	<b>Percentage</b>
0	8	25.0
<b>1</b>	<b>19</b>	<b>59.4</b>
2	5	15.6
<b>Prescribers</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Gynecologists</b>	<b>18</b>	<b>56.3</b>
PhD students	14	43.8



**Table 4.** Maternal-fetal prognosis.

Time to transfusion	Frequency	Percentage
<b>&lt;30 mn</b>	<b>15</b>	<b>47.6</b>
30 mn - 1 H	13	39.9
1 H - 2 H	4	12.5
Diaper or postpartum suites	Frequency	Percentage
Normal	27	84.4
<b>Complicated</b>	<b>5</b>	<b>15.6</b>
Complication	Frequency	Percentage
<b>Endometritis</b>	<b>4</b>	<b>12.5</b>
HELLP SYNDROME	1	3.1
RAS	27	84.4
Total	32	100%
Hb level Before transfusion (g/dl)	Frequency	Percentage
<7	<b>18</b>	<b>56.25</b>
[7 - 11]	14	43.75
>11	0	0.0
Hb level after transfusion (g/dl)	Frequency	Percentage
<7	2	6.25
<b>[7 - 11]</b>	<b>30</b>	<b>93.75</b>
>11	0	0.0
Length of Stay	Frequency	Percentage
<2	5	15.7
<b>2 - 4</b>	<b>27</b>	<b>84.3</b>
State at Exit	Frequency	Percentage
<b>Satisfied</b>	<b>30</b>	<b>93.8</b>
Not satisfied	2	6.2

59.4% by Cscm this rate is lower than that of M Ongoiba L H [20] but higher than that of M Saye [24]. **Compared to admission methods:** bleeding during pregnancy was the most frequent reason for admission at 28.1%; followed by CUD with 25%. **As for the history:** high blood pressure was found in two of our patients or 6.3%. M Saye and M Samaké [21] [24] found HTA; respectively 12.5% and 7.5%. All of our patients had never been transfused before. The primigestes and the Great multi gestures were represented with 31.3%. This rate is lower than that of M Saye and M Samaké [21] [24] who found respectively 33.8% and 35.4% for multi-gestures. The first ones were the most frequent at 37.5% this rate is similar to that of M Ongoiba L H [20] who also found 37.5%. Multiple deliveries cause a multi-scar endometrium and expose it to the risk of placenta previa or placenta accreta. Uterine fragility exposes it in the worst case

to uterine rupture or postpartum hemorrhage. In our study, seven (07) patients or 21.9% performed no NPC. This result is higher than that of M Saye [24] who found 98.8% in patients who performed NPCs compared to 1.2% in patients who performed no NPCs. This could be explained by a lack of awareness of the importance of NPCs by patients on the one hand, and the influence of sociocultural factors on the other. Eighteen (18) patients had an Hb level less than 7 g/dl or 56.25%. It is not usual for us to transfuse women with haemoglobin levels greater than 7 g/dl but this has occurred in situations where patients had poor clinical condition with clinical signs of acute anaemia and in cases of continuous bleeding. The haemoglobin level may have been available in 28 cases prior to the issuance of the blood voucher. **For the evaluation of risk factors:** non-realization of NPCs was found as a risk factor in seven (7) patients or 21.5%. Two (2) patients had a poor general condition of 6.3%. Conjunctival pallor was found in the 32 patients who were transfused, *i.e.* 100%. This rate is higher than that of M Saye and Mariam L T [24] [25] who found 27.5% and 77.2% respectively. Seven (7) patients had blood pressure figures between 6/4 and 10/08 cm Hg. Hyperthermia was found in three (3) patients or 9.4%. Tachycardia was found in 14 patients or 43.6%. This rate is higher than that of M Saye [24] who found 12.5%. **Obstetric situation at entry:** The hemorrhage was found in all patients or 100%. This rate is higher than that of M Saye [24] who found 87.5%, which shows that hemorrhage was the leading cause of anemia in our study. **The delivery mode:** only four (4) patients gave birth by caesarean section or 12.5%, against 24 patients or 75% who gave birth vaginally. This rate is lower than that of M Saye and K Sidibe *et al.* [24] [26] who found respectively 87.5% and 100% vaginal delivery.

**The prescription of blood products:** three (3) bags were requested in 16 cases or 50%. This shows the importance of the availability of a blood bank. In our study, one bag was transfused in 15 cases or 46.9%. M Samaké reports more than 49% or 97 out of 198 patients benefited from three blood bags. This study shows that the demand for blood products has been met in 40.6%. The cases of non-satisfaction were linked on the one hand to the unavailability of certain rhesus blood groups, and on the other hand to a lack of blood donors. **Preparation of other blood products:** Whole blood was the most requested in 32 cases followed by PFC which was requested in only 1 case. In Mariam L T's study [20] other blood products were not prescribed because whole blood was the most available and the most accessible, *i.e.* 99%. In the same series, the PFC was requested twice and was obtained only 1%. **Blood transfusion indications:** Immediate postpartum haemorrhage (IPPH) by tearing of the soft parts was the most found cause at 21.9%. This rate is lower than that of M Maiga S I [27] who found 48.5%; but higher than that of Mariam L T [25] who found 21%. **Blood prescribers:** the majority of blood requests were made by gynecologists or 56.3% followed by PhD students or 43.8%. This is explained that the opinion of gynecologists was always sought; except in emergency situations where transfusion

was almost necessary. This result is higher than that of M Saye [24] who found 20% for gynecologists and 12.5% for PhD students.

**The pre-transfusion test requested:** in our study the Rhesus Positive group was the most transfused blood (37.5%). This rate is higher than that of Mariam L T [25] who found 36.1%. In our study, all patients were transfused. The Hb level was requested in 31 cases or 96.9%. This rate is higher than that of Mariam L T [25] who found 94.6%. This is explained by the functionality of the lab. The time taken between the request and the availability was less than 30 minutes or 47.6%. More than half of the requests were obtained only after a waiting period of more than one hour, which is long enough for an urgent matter. Mariam L T [25] found an average time at 284,802 mn (>4 Hours); with extremes ranging from 7 mn and 300 mn (5H). More than half of the patients had an Hb level between 7 and 11 in our study after transfusion or 75%. This rate is lower than that of M Saye [24] who found 80.5% of patients who had an Hb level between 7 and 10.

### 5.3. Maternal Prognosis

**Length of stay:** In our study, the most frequent length of stay was 2 - 4 days or 84.3%. M Saye [24] provided 80% or 7% out of 80 patients did more than 5 days in the ward. It is necessary, however, to recall that the length of hospitalization depended on the obstetrical emergency that required the transfusion. Only 5 patients presented complications or 15.6%. The most common complications were postpartum endometritis (12.5%) and HELLP Syndrome (3.1%). Complications related to bleeding disorders were 3.1%. This result is higher than those of M Ongoiba L H and M Saye [20] [24] who found 0.7% and 2.5% of cases respectively. **Status of patients at discharge:** We have not recorded any maternal deaths due to postpartum haemorrhage. This result is satisfactory and lower than those of M Saye and M Ongoiba L H [20] [24] who recorded respectively 1% and 2% maternal deaths [28] [29].

## 6. Conclusion

The need for labile blood products remains a reality in obstetrics. The permanent availability of labile blood products improves the prognosis of immediate postpartum haemorrhages.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- [1] Lefrere, J.J. and Rouger, P. (2006) *New Practice of Blood Transfusion*. Elsevier Masson, Issy Les Moulineaux.
- [2] World Health Organization (2023) *Blood Safety and Availability*. <https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability>

- [3] Kouriba, B., Diarra, A. and Coulibaly, M.D. (2010) Mise en Place de L'Assurance Qualite dans un Etablissement de Transfusion Sanguine: L'Experience du Centre National de Transfusion Sanguine du Mali. <http://www.malimedical.org/2010/23b.pdf>
- [4] Dupuy, M., Maisonneuve, H. and Terra, J.L. (1999) The Clinical Audit: Methodological Bases for the Evaluation of Professional Practices. ANAES/Service d'évaluation en établissements de Sante.
- [5] Vincent, J.-L., Jaschinski, U. and Wittebole, X. (2018) Worldwide Audit of Blood Transfusion Practice in Critically Ill Patients. *Critical Care*, **22**, Article No. 102. <https://pubmed.ncbi.nlm.nih.gov/29673409/> <https://doi.org/10.1186/s13054-018-2018-9>
- [6] Dibi, K. and Adjoumani, F. (2005) Clinical Audit of Transfusion Practice in the Department of Gynecology and Obstetrics of the University Hospital of Treichville. <https://pesquisa.bvsalud.org/portal/resource/pt/afr-191545>
- [7] Letaief, M. and Hassine, M. (2005) Knowledge and Practices of Healthcare Staff in Transfusion Safety. *Transfusion Clinique et Biologique*, **12**, 25-29. <https://doi.org/10.1016/j.tracli.2005.01.002>
- [8] World Health Organization (1993) Safety of Blood and Blood Products: Blood Products Module. WHO, Geneva.
- [9] François, A. and Bierling, P. (2004) Blood Transfusion. Traite de médecine 4eme Ed, Flammarion, Paris, 2824-2830.
- [10] Gouëzec, H., *et al.* (2005) Indications for Labile Blood Products and the Physiology of Transfusion in Medicine. The French Agency for the Health Safety of Health Products. *Transfusion Clinique et Biologique*, **12**, 169-176. <https://doi.org/10.1016/j.tracli.2005.04.011>
- [11] Sidibe, H. (1992) Anaemia of the Mother-Newborn Couple in Bamako: Place of Iron and Folate Deficiency, about 219 Couples. (in French) <https://bibliosante.ml/bitstream/handle/123456789/9938/92M17.pdf?sequence=1&isAllowed=y>
- [12] Toure, M.H. (1996) The Prevalence of Anemia in Pregnant Women. Thesis of Medicine, University of Bamako, Mali.
- [13] MERGER (1966) Regarding the Definition of Abortion. 6th Edition, Paris, France.
- [14] Arurkumaran, S. and Tamizian, O. (2002) The Surgical Management of Post-Partum Haemorrhage. *Best Practice & Research Clinical Obstetrics & Gynaecology*, **16**, 81-98. <https://doi.org/10.1053/beog.2002.0257>
- [15] Coat, J.P., *et al.* (1999) Management of Severe Postpartum Hemorrhages by Arterial Embolization. *The European Journal of Obstetrics & Gynecology and Reproductive Biology*, **28**, 55-61.
- [16] Pritchard, J.A., Baldwin, R.M., Dickey, J.C. and Wiggins, K.M. (1962) Blood Volume Changes in Pregnancy and the Puerperium. *American Journal of Obstetrics & Gynecology*, **84**, 1271-1282. [https://doi.org/10.1016/S0002-9378\(16\)35734-9](https://doi.org/10.1016/S0002-9378(16)35734-9)
- [17] Combs, C.A., Murphy, E.L. and Laros, R.K. (1991) Factors Associated with Postpartum Hemorrhage with Vaginal Birth. *Obstetrics & Gynecology*, **77**, 69-76.
- [18] Nordström, L., Fogelstam, K., Fridman, G., Larsson, A. and Rydhstroem, H. (1997) Routine Oxytocin in the Third Stage of Labour: A Placebo Controlled Randomised Trial. *BJOG: An International Journal of Obstetrics & Gynaecology*, **104**, 781-786. <https://doi.org/10.1111/j.1471-0528.1997.tb12020.x>
- [19] Mannuccio Mannucci, P. and Levi, M. (2007) Prevention and Treatment of Major

- Blood Loss. *The New England Journal of Medicine*, **356**, 2301-2311.  
<https://doi.org/10.1056/NEJMra067742>
- [20] Ongoiba, I.H. (2006) Hemorrhages of the Immediate Postpartum in the Gynecology and Obstetrics Department of the Reference Health Center of Commune V of the District of Bamako. About 144 Cases.  
<https://bibliosante.ml/bitstream/handle/123456789/7855/06M224.pdf?sequence=1&isAllowed=y>
- [21] Samaké, M. (2008) The Place of Blood Transfusion in the Management of Obstetrical Emergencies in the Gynecological-Obstetrics Department of the Reference Health Center of Commune V of the District of Bamako. Thesis of Medicine, University of Bamako, Mali.
- [22] Salomon, C. and Julien, A.M. (1994) Homologue Blood Transfusion. In: Najman, A., Verdy, E., Potron, G. and Grivaux, F.I., Eds., *Accurate Blood Diseases, Volume II*, Paris, 626-672.
- [23] Tangara, O. (2004) Co-Infection Hepatitis B and Hepatitis C among Blood Donors at the CNTS in Bamako. Thesis of Medicine, University of Bamako, Mali.
- [24] Saye, Z. (2016) Transfusion Needs in Obstetric Emergencies in the Gynecology and Obstetrics Department of the Reference Health Center of Commune III of the District of Bamako. Thesis of Medicine, University of Bamako, Mali.
- [25] Mariam, L.T. (2009) Transfusion Needs in Obstetric Emergencies in the Gynecology and Obstetrics Department of the CHU Gabriel Touré. Thesis of Medicine, University of Bamako, Mali.
- [26] Sidibe, K., Dao, S.Z., Kassambara, B.D., *et al.* (2019) Hemorrhage of the Immediate Postpartum at the Reference Health Center of Commune II of the District of Bamako, Mali. <https://www.revues.ml/index.php/rmst/article/view/1421>
- [27] Maiga, S.I. (2010) Hemorrhage of the Immediate Postpartum at the Reference Health Center of Commune I of the District of Bamako. Thesis of Medicine, University of Bamako, Mali.
- [28] The Ottawa Hospital (2022) Information on the Health Status of Patients.  
<https://www.ottawahospital.on.ca/en/>
- [29] Maternal Mortality [DHS V].  
<https://dhsprogram.com/topics/Maternal-Mortality.cfm>