



## Transfusion practice: Experience of Joseph Ravoahangy Andrianaivalona Hospital Analamanga Regional Blood Transfusion Center, Madagascar

## Pratique transfusionnelle : expérience de l'hôpital Joseph Ravoahangy Andrianaivalona Centre régional de transfusion sanguine Analamanga, Madagascar

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## ABSTRACT

**Background:** Blood transfusion is therapeutic means used in management of many pathologies. Our aim was to describe transfusion practice in Madagascar.

**Method:** A prospective study was performed to describe the indications for blood products issued from the blood bank of Analamanga regional blood transfusion center of University Hospital Joseph Ravoahangy Andrianaivalona, Antananarivo.

**Results:** The mean age of the patients was 35.6 years (standard deviation [SD] = 8.2), the male: female ratio was 0.85. The majority of prescriptions came from obstetrics and gynaecology (35.9%); surgery (25.7%) and medicine (22.6%). A total of 17 253 transfused patients received 28 437 blood transfusion with satisfaction rate of 73.6%.

**Conclusion:** As transfusion center, this study informs us about the needs of bloods, the main prescribing departments and indications for transfusion. This data will serve as a basis for study on relevance of blood prescription in Malagasy hospitals.

## RÉSUMÉ

**Contexte :** La transfusion sanguine est un moyen thérapeutique utilisé dans la prise en charge de nombreuses pathologies. Notre objectif était de décrire la pratique transfusionnelle à Madagascar.

**Méthode :** Une étude prospective a été réalisée pour décrire les indications des produits sanguins issus de la banque du sang d'Analamanga, centre régional de transfusion sanguine du CHU Joseph Ravoahangy Andrianaivalona, Antananarivo.

**Résultats :** L'âge moyen des patients était de 35,6 ans (écart-type [SD] = 8,2), le rapport hommes/femmes était de 0,85. La majorité des prescriptions provenaient du service de gynécologie/obstétrique (35,9 %) ; chirurgie (25,7%) et médecine (22,6%). Au total, 17 253 patients transfusés ont reçu 28 437 transfusions sanguines avec un taux de satisfaction de 73,6%.

**Conclusion :** En tant que centre de transfusion, cette étude nous renseigne sur les besoins en sang, les principaux services prescripteurs et les indications de transfusion. Ces données serviront de base à une étude sur la pertinence de la prescription de sang dans les hôpitaux malgaches.

## INTRODUCTION

Blood transfusion is a therapeutic means used in the management of many pathologies. Transfusion is a replacement therapy which consists in compensating for the constitutional or acquired deficits of one or more constituents of blood<sup>1</sup>. Transfusion involves both benefits and risks and complications. Considering the socio-economic context of Madagascar, transfusion is often unavoidable due to lack of therapeutic alternatives. A study on blood products use at regional blood transfusion center blood bank Analamanga of Joseph Ravoahangy Andrianavalona Antananarivo hospital was performed. Our objective was to evaluate transfusion practice and blood products at that hospital according to prescribing department.

## MATERIALS AND METHODS

### *Study design*

A prospective cross-sectional study was performed.

### *Setting*

Straddling the Indian Ocean and Africa, Madagascar is one of largest island countries in the world, with an area slightly larger than France, with a population of nearly 27 million Malagasy people.

Despite its abundant natural resources, the country has one of the highest poverty rates in the world.

Before the coronavirus pandemic (COVID-19), the Malagasy economy was on an upward trajectory but an estimated 75% of population still living below international poverty line of \$ 1.90 in 2019 - a rate well above the regional average of 41%<sup>2</sup>.

Our study was carried out at the Analamanga regional blood transfusion center of the Joseph Ravoahangy Andrianavalona Antananarivo hospital. Towards the end of 2017, the Malagasy Health Ministry set up a new blood transfusion organisation in Madagascar as part of the Africa Society for Blood Transfusion (AfSBT) step-wise accreditation program (SWAP). Each of Madagascar's six regions has a Regional Blood Transfusion Center (CRTS) administratively and financially attached to a hospital and technically supported by Ministry of Health Blood Transfusion Direction which ensures the supply of reagents, consumables and equipment as well as technical support, the implementation and quality monitoring as well as haemovigilance of each center.

Our center is both a transfusion center and a hospital blood bank. We ensure the blood supply of around ten public hospitals and twenty approved private structures in Antananarivo.

### *Study population*

Study population was prescriptions for labile blood products submitted to Joseph Ravoahangy Andrianavalona Hospital Blood

Bank, Madagascar.

### *Inclusion criteria*

All labile blood product (LBP) prescriptions between 01 January 2020 and 31 December 2020 were included in this study. This included LBPs delivered to clinical departments in public and private hospitals in Antananarivo.

### *Exclusion criteria*

Poorly filled prescriptions or with incomplete data (patient identity, age, gender, prescribing department, prescribing doctor, reason for prescription, type and quantity of product requested) were excluded.

### *Variables*

The following parameters were collected: age of patients, gender, blood groups of patients (ABO, RhD), prescriber department, indication for LBP, haemoglobin and platelet count, type and quantity of LBP requested and delivered.

### *Data sources*

Each hospital department is provided with a blood product prescription slip with information concerning patient (name, first name, age, gender, blood group), department, hospital and prescriber, type and quantity of product requested as well as blood count data). Relevant data was collected from these blood sample cards.

### *Statistical methods*

Then data were recorded and processed using Microsoft Excel® and XLSTAT® software. Descriptive statistics are expressed as median for continuous variables, and categorical variables are expressed as frequency (%). In order to compare with the results of other studies, the mean and standard deviation were calculated as necessary.

## RESULTS

### *Characteristics of transfused patients*

During the study period, 17 253 prescriptions meeting the inclusion and exclusion criteria were submitted to the Joseph Ravoahangy Andrianavalona Hospital Blood Bank.

The mean age of participants was 35.6 years (standard deviation [SD] = 8.2), range = 1 day to 95 years, median = 37.2 years. Most (86.8%) participants were over 15 years old. Distribution of participants by age group is shown in **Figure 1**. Sex ratio was 0.85 (male = 7 912; 45.9%, female = 9 341; 54.1%). Distribution of participants by blood group is shown in **Table 1**.

### *Prescribing departments*

The majority of prescriptions were submitted from the following departments: Obstetrics and Gynaecology (35.9%), Surgery (25.7%) and Internal Medicine 22.6% (**Table 2**).

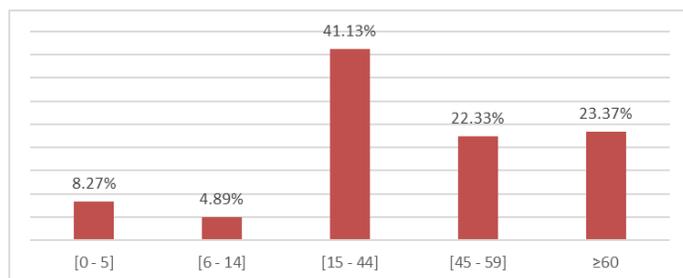


Figure 1: Distribution of patients by age group

Table 1: Distribution of patients by blood group

Blood system	Blood group	Number (%)
ABO	O	11 536 (40.6)
	B	8 815 (31.0)
	A	6 245 (22.0)
	AB	1 841 (6.5)
RhD	Positive	28 127 (98.9)
	Negative	310 (1.1)

Table 2: Distribution of prescriptions and labile blood products by department

Department	Prescriptions n (%)	LBP n (%)	RBC n (%)	WB n (%)	PRP n (%)	FFP n (%)
Oncohaematology	548 (3.2)	1194 (4.2)	402 (2.7)	593 (6.9)	125 (5)	74 (3)
Medicine	4 484 (26)	6 427 (22.6)	2 722 (18.3)	1 430 (16.7)	2 052 (82)	223 (9)
Surgery	4 472 (25.9)	7 308 (25.7)	3 450 (23.2)	2 224 (25.9)	100 (4)	1 534 (62)
Obstetrics and Gynaecology	6 184 (35.8)	10 209 (35.9)	7 213 (48.5)	2 624 (30.6)	50 (2)	322 (13)
Intensive care unit	785 (4.5)	2 190 (7.7)	625 (4.2)	1 193 (13.9)	100 (4)	272 (11)
Emergency	667 (3.9)	967 (3.4)	357 (2.4)	510 (5.9)	50 (2)	49 (2)
Paediatrics	113 (0.7)	142 (0.5)	104 (0.7)	13 (0.2)	25 (1)	0 (0)
Total	17 253 (100)	28 437 (100)	14 873 (100)	8 588 (100)	2 502 (100)	2 474 (100)

LBP, labile blood products; RBC, red blood cell; WB, whole blood; PRP, platelet rich plasma; FFP, fresh frozen plasma

### Indication for transfusion

In 92.6% of cases, prescription was for anaemia whatever its cause. Haemoglobin prompting a transfusion ranged from 2 g/dL to 11 g/dL with a median of 7.2 g/dL. **Table 3** shows distribution of patients according to the indications for prescribing LBP.

### Quantity and nature of LBP

A total of 17 253 transfused patients received 28 437 LBPs with a satisfaction rate of 73.6%; or 52.3% of red blood cell (RBC), 30.2% of whole blood (WB), 8.8% of platelet rich plasma (PRP) and 8.7% of fresh frozen plasma (FFP). Transfused patients received an average of 1.7 RBCs (range 1-8), 1.7 WB (range 1-4), 1.3 FFP (range 1-8) and 1.5 PRP (range 1-5). The largest amounts of RCC were transfused into patients with anaemia associated with perioperative haemorrhagic shock. LBPs distribution is shown in **Table 2**.

Table 1: Distribution of patients according to indication for labile blood products

Department	Prescription indication	Number (%)
Obstetrics and Gynaecology	Postpartum haemorrhage	2 071 (12.0)
	Ectopic pregnancy	1 109 (6.4)
	Metrorrhagia	1 079 (6.3)
	Hysterectomy	466 (2.7)
	Retro-placental haematoma	438 (2.5)
	Uterine rupture	438 (2.5)
	Hydatidiform mole	321 (1.9)
	Placenta-previa	262 (1.5)
Surgery	Gastrointestinal	2 766 (16.0)
	Cardiovascular	968 (5.6)
	Urologic	554 (3.2)
	Orthopedic	184 (1.1)
Medicine	Renal failure and haemodialysis	1 739 (10.1)
	Gastrointestinal bleeding	1 243 (7.2)
	Infections	955 (5.5)
	Cardiovascular illnesses	349 (2.0)
	Other	198 (1.2)

## DISCUSSION

### Context

In Madagascar, the lack of means and therapeutic alternatives makes blood transfusion a frequent recourse in practice. Blood transfusion involves risks and is not without complications<sup>1</sup>, especially infectious ones, the seroprevalence of which is still high in blood donors<sup>3</sup>.

This study allowed us to analyse LBPs use, determine LBPs needs, describe the characteristics of transfused patients and identify the most common reasons for requesting LBPs.

### Patient characteristics

Our study covered all requests for LBP from public and private hospitals in Antananarivo during 2020 submitted to our blood bank, which could be fairly representative of the transfusion context in hospitals in Madagascar.

In our series, most transfusions were prescribed to patients older than 15 years of age, which is surprising given the young median age of the Malagasy population (19.6 years)<sup>4</sup>, and in contrast to data from other low-income countries, where up to 54% of transfusions are for children under the age of 5 years<sup>5</sup>.

### Prescribing departments and indication for transfusion

Anaemia is often endemic in Africa and is linked to the near-chronic infestation with malaria and intestinal worms. Malnutrition and undernourishment leading to iron, folic acid or vitamin B12 deficiencies as well as protein deficiency are also involved. Among the prescriptions of LBP, those coming from Obstetrics and Gynaecology departments are the most represented. According to a study carried out in 2015, in an Obstetrics and Gynaecology hospital in Antananarivo, the frequency of transfusion in parturients is 7.1%,

which remains high compared to what is reported in literature<sup>10</sup>. Indeed, the difficulty encountered by practitioners lies in the complications related to pregnancy and childbirth frequently linked to a precarious situation, a lack of monitoring of the pregnancy and a delay in care.

The majority of patients receiving LBP transfusions from Internal Medicine were hospitalised in the Nephrology department for end-stage chronic renal failure requiring haemodialysis. Blood transfusion use is almost systematic in haemodialysis patients<sup>11,12</sup>. Moreover, therapeutic alternatives such as erythropoietin or iron are not within the reach of all patients in our setting. A study carried out at the Nephrology Department at Befelatanana Hospital, Madagascar, showed that transfusion is the most accessible treatment for most patients with renal failure<sup>13</sup>. This shows the need for access to appropriate non-transfusion management of anaemia in chronic kidney disease in our country.

We found that 25.9% of prescriptions came from Surgical Departments, which is similar finding to a French study, which showed that 24.0% of LBP delivered were intended for surgical departments<sup>14</sup>.

#### *Appropriateness of transfusion*

A prescription is considered to be appropriate if the expected effect corresponds to a symptom(s) control objective and if it complies with the transfusion thresholds recommended in the observed clinical situation<sup>15</sup>.

The prescription of blood transfusion is governed by rules and must be done under very specific clinical and biological conditions because of risks and complications to which it exposes<sup>1</sup>. It should be noted that in our practice, the indication for blood transfusion should be based both on the erythrocyte constancy values (haemoglobin level in particular) and on the clinical tolerance of the anemia. The lower limits for hemoglobin are around 7 g/dL; value below which transfusion is difficult to avoid. Most transfusions in this study were thus appropriate.

#### *Quantity and nature of LBP*

In our study, around two units of blood per patient was transfused. Transfusion was performed in 52.3% of cases with red blood cell, 30.2% of cases with whole blood, 8.8% of cases with platelet rich plasma (PRP) and 8.7% of cases with fresh frozen plasma (FFP). While more whole blood use has been reported in a study in the Obstetric and Gynaecology departments in Abidjan, Ivory Coast<sup>16</sup>, whole blood use is usually reserved for haemorrhagic syndrome with a combination of anaemia and haemostasis disorder in our setting. On the other hand, the lack of knowledge or indifference on the part of prescribers to the LBP indications may explain the prescription for whole blood<sup>16</sup>.

#### **Limitations**

The limitation of our study lies in the fact that we analyzed the LBP prescription sheets. We were unable to follow up LBP use in patients in the different clinical departments. However, the data we have collected has informed us about the types of patients transfused, the types of LBP used and the main indications for transfusion in our hospitals.

#### **CONCLUSION**

As blood transfusion center, this study provides us information on the LBPs needs of hospitals in our region and thus will allow us to subsequently implement strategies in order to be able to provide for the LBPs needs and to build up a safety stock. As hospital blood bank, this study provides us information on the main prescribing departments and the most frequent reasons for prescribing and may thus constitute a starting point for a study on prescribing LBP relevance in a hospital environment.

#### **Conflict of interest**

None.

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