RESEARCH ARTICLE   **OPEN ACCESS**

TRACEABILITY OF BLOOD PRODUCTS FROM BLOOD BANKS TO PATIENTS BEDS IN THE UNIVERSITY HOSPITALS CENTERS OF BOUAKÉ AND TREICHVILLE, CÔTE D´IVOIRE

[1]Hyda Jules, *[2]Sekongo Yassongui Mamadou, [3]Kambe Kambe Yves, [4]Bierou Bodé Thomas, [5]Tchimou Guépié Jérémie, [6]N'guessan Kouassi Bath Onésime and [7]Konaté Seidou[7]

[1]Blood Services Coordination, National Blood Transfusion Service, Abidjan, Côte d'Ivoire; [2]Training and research service, National Blood Transfusion Service, Abidjan, Côte d'Ivoire; [3]Institute of Ethno-Sociology, Félix Houphouet Boigny University, Abidjan, Côte d'Ivoire; [4]Bouake blood transfusion antenna, National Blood Transfusion Service, Abidjan, Côte d'Ivoire; [5]Blood product distribution service, National Blood Transfusion Service, Abidjan, Côte d'Ivoire [6]President's Emergency Plan For AIDS Relief project (CNTS/PEPFAR); [7]The Head of the Administration, National Blood Transfusion Service, Abidjan, Côte d'Ivoire

ARTICLE INFO

ABSTRACT

The evaluation of the traceability of blood components in Teaching Hospital Center (THC) of Bouaké and Treichville, Côte d'Ivoire aimed to describe and compare the traceability of blood components in their THC for the improvement of the procedures of blood flow in the hospital. In this *d*escriptive, prospective, transversal and comparative study, data were collected using a questionnaire during some exhaustive recruitment of the purchase order forms of all the units of blood components delivered from August 4th to October 3rd, 2014. Overall, 2,152 units of BP were enlisted and drawn. The results of the evaluation reveal that for 13 purchase orders (0.6) percent of the recruitments, the prescribing blood whose identity appeared on the order form did not exist in the care's department. In 166 cases on 2,152 realized recruitments, that is 7.7 percent of the cases, the patient mentioned on the purchase order form was not known of the care's department. 424 units of PSL are 19.7 percent of the served PSL did not arrive in the care's department, in the bed of the sick person. These results are low in THC of Bouaké which accommodate a blood transfusion service. At conclusion, the promiscuity or cohabitation reduce the blood component decrease.

INTRODUCTION

Blood donation in Côte d'Ivoire is based on voluntary and non-remuneration. The National Blood Transfusion Center (NBTC) of Côte d'Ivoire is a public health structure which has the mission of collecting blood for the establishment of blood banks, the biological qualification of donations, the supply of care establishments (CE) throughout the Ivorian territory, training and research (Bontez, 1993). The Ivorian transfusion system is centralized and computerized (Bates, 2007). Since October 2004 to date, thanks to the support of PEPFAR (President's Emergency Plan for AIDS Relief) and other technical and financial partners, blood transfusion in Côte d'Ivoire has experienced a strengthening of its services (NBTC, 2014). Thus, many achievements have been made, notably the deconcentration of transfusion activities (from 04

structures in 2004 to 27 in 2014), the development of a recruitment and retention or retention program for donors at lower risk for HIV, increase in the number of blood bags collected each year from 78,000 in 2004 to 155,534 in 2015, the improvement in the diversification rate of blood products (98.2%) and the implementation in health establishments of a program aimed at to improve the clinical use of blood (NBTC, 2016). The NBTC has a good command of transfusion activities from collection to distribution and can undertake daily actions to gradually alleviate the shortage of quality bloog products. In fact, the transfer of these blood products is done either in batches (supply of hospital blood banks) or by name (delivery to parents of patients). This operation is carried out by computer and traced in the NBTC database. However, once the blood products have been distributed to applicants, their clinical use in health establishments is unknown to the

NBTC. In addition, unpublished data from the NBTC has shown that sometimes, blood products are subject to diversion for the benefit of unidentified or non-localized beneficiaries, thus compromising efforts to trace the units of blood distributed. We conducted an observational study, in two university hospitals centers in Côte d'Ivoire, whose objective was to quantify the loss of blood products from the blood bank at the patient's bedside.

MATERIALS AND METHODS

We carried out a prospective, transversal, descriptive and comparative study over the period from April 04, 2014 to October 03, 2014. It took place in the University Hospital Centers (CHU) of Bouaké and Treichville in Côte d'Ivoire. The first cited (CHU de Bouaké) houses the premises of the city's Blood Transfusion antenna. The hospital blood bank is housed within the blood transfusion antenna. The latter therefore manages all the activities of the transfusion chain, that is to say from the collection to the nominal distribution of blood and blood products to patients of the CHU. As for the Treichville University Hospital, it only houses the blood bank. The supplying transfusion center is located approximately one kilometer from its premises. The sampling, was of systematic random type. We proceeded to the exhaustive and concomitant enlistment of the units of labile blood products distributed on each of the two sites, during the period of the study. The study data were collected through three (3) sources, namely the distribution register of labile blood products available at hospital blood stores, the medical prescription of blood products or order form, the medico-technical software of the NBTC (Progesa) and the daily information sheet. Three methods were used for data collection for this study, namely the document review, data extraction and observation. The documentary review focused on blood product distribution registers, blood product order forms. The data collection was done using a questionnaire called the data collection form. The second (data extraction) concerned the NBTC database hosted by the Progesa medico-technical software. The observation, for its part, consisted in directly observing the blood bags investigated in the care services. The analysis of the data was based on the description of the demographic data of recipients of blood products. Likewise, the variables relating to non-compliant prescriptions and the traceability of blood products have been described. Data entry was made from an entry mask developed in Epidata 3.1. Data analysis was done using Stata 11.0 software.

Ethical Considerations : The study protocol and other related documents (data collection form, consent form, etc.) have been approved by the National Committee for Ethics and Research of Côte d'Ivoire (CNER) and the Ethics of the Atlanta CDC (Institutional Review Board).

RESULTS

During the investigation, 2,152 PSL purchase orders were satisfied, of which 1,149 or 53.4% at the CHU of Treichville and 1,003 or 46.6% at the CHU of Bouaké (Table I).

Table 1. Distribution of purchase orders served during the investigation period

Structure	Valeur Absolue	Valeur Relative
CHU Bouaké	1 003	46,6%
CHU Treichville	1 149	53,4%
TOTAL	2 152	100,0%

Table 2. State of the services requesting blood products during the investigation period

Structure	Existence		Functionality	
	OUI	NON	OUI	NON
CHU Bouaké	1003 100,00%	0 0,0%	1003 100,00%	0 0,0%
CHU Treichville	1148 99,95%	1 0,05%	1148 99,95%	1 0,05%
TOTAL	2 151 99,95%	1 0,05%	2 151 99,95%	1 0,05%

As part of the traceability of the blood products honored, the majority of the services mentioned on the blood order forms (2,151 or 99.95%) exist and are functional in the two hospitals. Only one case of non-existence and non-functioning of the service was recorded at the Treichville University Hospital (Table II).

Table 3. Distribution according to the existence or not of prescribing doctors and patients

Structure	Known prescribing doctor		Patient mentioned on the known order form	
	YES	NO	YES	NO
CHU Bouaké	1002 99,90	1 0,10	982 97,91	21 2,09
CHU Treichville	1137 98,96	12 1,04	1004 87,38	145 12,62
TOTAL	2 139 99,4%	13 0,6%	1 986 92,3%	166 7,7%

In 13 cases (0.6%), the prescribing doctor whose identity appeared on the purchase order did not actually exist in the care service where he was supposed to be. In 7.7% of cases, the patient mentioned on the purchase order supposed to be the beneficiary of the PSL delivered was not known to the care service where he was supposed to be (Table 3).

Table 4. Service cross-checked with the number of cases where the blood products did not reach to the patient's bed

Services	CHU Bouaké	CHU Treichville
Medical emergencies	5	213
Childbirth / Gyneco-Obstetrics	21	42
Surgical emergencies	10	39
Paediatrics	9	11
Surgery	2	21
Internal Medicine	2	28
Reanimation	4	3
Cancerology	0	10
Infectious and Tropical Diseases	0	2
ORL	0	1
Hemodialysis	0	1
TOTAL	53	371

Regarding the actual arrival of the blood products served in the care service, 424 cases of blood products served (19.7%) did not arrive at their destination at the patient's bedside. The Treichville university hospital with 371 out of 1,146 vouchers honored, or 32.95%, is the structure with the highest dropout rates for PSLs. The most represented services are the medical emergency and Childbirth / gyneco-obstetrics services for the CHU Treichville with 213 cases and 42 cases respectively. At the CHU Bouaké, the Childbirth / Gyneco-Obstetrics service with 21 cases is the most represented (Table IV).

DISCUSSION

The supply of quality blood and the knowledge, skill and resources for the proper and rational use of blood are essential

for the proper functioning of medical services [5, 6] (Roberts et al., 2016; CNTS, 2012). During the period of our study, 2,152 PSL purchase orders were satisfied, of which 1,149 or 53.4% at the CHU Treichville and 1,003 or 46.6% at the CHU Bouaké. These two university hospital structures have almost the same rate of transfusion because they contain within them the same clinical services and are all located in large cities. As part of the traceability of the honored blood products, the majority of the services mentioned on the blood order forms (2,151 or 99.95%) exist and are functional in hospital structures. Only one case of non-existence and non-functioning of service was recorded at the CHU of Treichville. There are strict procedures for managing, allocating and if possible reallocating unused blood products. However, reallocation encounters difficulties in the health systems of developing countries in general and in Côte d'Ivoire in particular. Indeed, there is no connection (computerization) between healthcare establishments (HE) and blood transfusion services (BTS) This procedure was described in 2013 by Jeanne [7] in Transfusion management far from a site of the French blood establishment. She noted that the remoteness of an HE from the sites of an BTS of the French blood establishment (EFS), imposes different methods of making blood products available in this establishment, to ensure proper management of transfusions for patients. Thus, reassignments in HS blood banks or HE services, when blood products delivered by the referring BTS are not transfused to the intended patient, and the time required is compatible with the transfusion of another patient, this second delivery is carried out by the BTS without the blood products physically leaving the blood bank or the HE service. It is the subject of a procedure established between the HE and the BTS, specifying the modalities of transmission of the appropriate data. Similarly, a blood product issued by a blood bank can be issued a second time, respecting the principles of good transfusion practices.

In addition, the mismatch between the need for labile blood products and the availability in blood transfusion centers creates a daily drama, perceptible in front of maternity services, operating theaters and emergency reception services (WHO, 1999). Thus, faced with this situation of insufficient PSL to meet the needs of patients or even a shortage, the care units preserve or store the blood products acquired from patients not transfused from their service for possible demand. In addition, in the event of a shortage of blood banks in healthcare establishments, the parents of patients will get their supplies directly from the BTS which are the Treichville BTC in our study. Our study showed that 19.7% of the blood products delivered by hospital blood banks and the distribution service of the Treichville BTC did not reach the patient's bed. Our data are far superior to the results from Burkina Faso, where the agreement rate between the scheduled recipient and the actual recipient of blood products is 92.9 to 98.0% (Dahourou, 2011). In addition, in Côte d'Ivoire, this study made it possible to quantify the loss of blood products and to provide data on traceability and haemovigilance, which remains a very weak link in transfusion safety in developing countries. This weakness was portrayed by Ayob in 2010 (Ayob, 2010). He reported that there is very little information on transfusion data, which undermines the traceability of labile blood products and haemovigilance activities and, in turn, poses the problem of national haemovigilance programs in developing countries. This finding is supported by the WHO 2004-2005 (WHO, 1999). Blood Safety database which indicated that national haemovigilance systems are present in

only 42 (40%) of 105 countries. For his part, Kabinda in 2015, pointed out that there was too little reported and documented information on the indications for blood transfusion, on the course of the transfusion or the per- and post-transfusion reactions. Thus, reflecting on the possibility of setting up a haemovigilance system in the countries of sub-Saharan Africa, Dahourou and al. (Dahourou, 2011) concluded that it was possible and that, it must go through negotiation between transfusion centers and hospital staff encouraged by the existence of official regulations on blood transfusion. Consequently, the coexistence of the BTS and the CHU of Bouaké largely solves this problem.

Conclusion

This study made it possible to quantify the rate of loss of blood products from the blood banks at the patient's bed. It appears that 19.7% of the blood products issued by hospital blood banks and the distribution service of the Treichville BTS do not reach the patient's bed. The distance between HE and BTS, and the obvious mismatch between blood products needs and availability in HE, contribute to this loss. Thus, the HE - BTS cohabitation adopted by the NBTC in its policy of deconcentration of its structures is a solution to curb the problem in HE sharing the same geographic field. Hemovigilance can rely on this policy to establish itself on the condition that the different parties are genuinely involved.

Acknowledgments

Conflict of interest: The authors report no conflict of interest in this article.

REFERENCES

Ayob Y. Hemovigilance in developing countries. Biologicals, 2010,38; 1: 91-6. doi: 10.1016 / j.biologicals.2009.10.002. Epub 2010 Feb 4. Review.

Bates I, Manyasi G, Medina Lara A, , Reducing replacement donors in Sub-Saharan Africa: challenges and affordability. Transfus Med., 2007, 17; 6: 434-42.

Bontez W, Bondurant A: Legislation on blood transfusion in Côte d'Ivoire. Infectious and tropical pathology, Abidjan, Côte d'Ivoire, March 17-19, 1993. p40

Chobli M. What blood for which patients in Africa in 2011? Rev. Afr. Anesth. Med. Urg., 2011, 16; 1

Dahourou H, Tapkob JB., Nébié Y, Kiénou K, Sanou M, Diallo M., Barroa L, Murphy E, Lefrèree JJ. Implementation of haemovigilance in sub-Saharan Africa. Clinical and Biological Transfusion, 2011, 19; 1: 39–45, http://dx.doi.org/10.1016/j. tracli.2011.11.001

Jeanne M. Management of transfusions far from a site of the French blood establishment, SFARVF3, 2013, [available] http://sofia.medicalistes.org/spip/IMG/pdf/Gestion_des_tra

nsfusions _loin_d_un_site_de_l_etablissement_francais_ du_sang.pdf

National Blood Transfusion Center (NBTC), Côte d'Ivoire: Activity report. Management Board (COGES), April 2014.

National Blood Transfusion Center (NBTC), Côte d'Ivoire: Activity report. Management Board (COGES), February 2016.

National Blood Transfusion Center (NBTC), Côte d'Ivoire: Activity report. Management Board (COGES), March 2011

Roberts DJ, Field S, Delaney M, Bates I, 2016, Problems and Approaches for Blood Transfusion in the Developing Countries, Hematol Oncol Clin North Am. 2015, 30; 2: 477-95. doi: 10.1016 / j.hoc.2015.11.011.

World Health Organization (WHO). Blood safety, Checklist for national blood transfusion programs, 1999, Geneva.

****