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Analysis of blood transfusion requirements during the gravido-puerperal period in a hospital in Ouagadougou

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Abstract. This work was carried out with the aim to analyze the needs covered and not covered in blood during the gravid-postpartum period.

This retrospective study covered the period from 1st January 2007 to December 31, 2009. It took into account the records of patients admitted to a direct or indirect obstetric causes, and has received an indication for transfusion.

450 patients had an indication for transfusion during the gravid-puerperal period. The main indications for transfusion were posed in front of 75.1% and 24.9% bleeding to chronic anemia. The rate of pre-transfusion hemoglobin averaged 5.7g/dl and 58.5% of women had a lower rate 6g/dl. Among the 450 women, 84.4% were transfused. The unmet need was 15.6%. The unavailability of blood was the main reason for unmet need (74.6%). Transfusion incidents or accidents were reported in 8.1%. The prognosis was better if breast coverage need for transfusion ($p = 0.00056$), however, remained subject to a mortality of 4%.

Blood transfusion, often essential to preserve the life of the mother and child must be more accessible while respecting the established protocols in order to limit the risks.

Keywords. Transfusion, gravid-puerperium, needs.

1 Introduction

Blood transfusion is an essential function of complete emergency obstetric and neonatal care. In the last few years, numerous efforts have been made in Africa to increase the availability of blood products in order to improve maternal prognosis which is still burdened by a serious mortality with respect to haemorrhagic and anaemia complications during pregnancy. In Burkina Faso approximately one quarter of maternal deaths are directly related to obstetric haemorrhaging with the absence of blood products available in time for a transfusion as a determining factor. Blood transfusion

requirements have increased in the sector 30 district hospital since 2003. At the time there was no blood product reserve or bank. In case of an indication of transfusion, emergency or otherwise, the blood product is supplied by the blood bank of the Centre Hospitalier Universitaire Yalgado Ouédraogo (CHU-YO) located 6 km away. In the beginning of 2009, the sector 30 district hospital became “autonomous” with the inauguration of its distributor bank due to an increase in the requirements. In spite of the progress obtained, some insufficiencies remain as its supply remains dependent of the National Blood Transfusion Centre. If the requirements not covered remain great, it could be a source of materno-foetal morbidity and mortality. Therefore, we thought it was necessary to dedicate this study to this problem in order to analyse the transfusion requirement cover during the gravid-puerperal period in this district hospital.

Table 1. Obstetric activity from 2007 to 2009.

Activities	Number of patients
Birth	7721
• Caesarean	2251
Obstetric complications	3627
• 1 st trimester haemorrhages	886
• 3 rd trimester haemorrhages	129
- post-partum haemorrhages	489
Transfusion requirement	450

2 Patients and methods

The gynaecology and obstetrics department of the sector 30 district hospital of the city of Ouagadougou was the framework of this study. It is a retrospective study from the 1st January 2007 to the 31st December 2009. We included in this study all the women hospitalised in the district hospital maternity during pregnancy, labour and up to the 42nd day post-partum or abortum, for whom a transfusion related to the gravid-puerperal period was indicated when the haemoglobin level less than 6g/dl or in front of hypovolemic shock related to massive bleeding. The data related to the obstetric blood transfusion were compiled from the obstetric records and the different records: birth record, operating block record (anaesthesia report and operative record), transfusion record, distributor bank registry and blood tickets. The statistical comparison was performed using the Fischer and Pearson chi square tests, with a level of significance of $p < 0.05$.

3 Results

3.1 Frequency of transfusion requirement during the gravido-puerperal period

Between the 1st January 2007 and the 31 December 2009, 11201 patients were admitted in the obstetric gynaecology department of the Sector 30 district hospital of Ouagadougou. Table 1 shows the obstetric activity during the study period:

The transfusion requirement found among the 450 patients corresponded to 5.8% (450/7721) of admissions for births and 12.4% (450/3627) of obstetric complications. Among patients who delivered, the need for transfusion concerned 149 women or 33.1% (149/450). Patients who had a blood transfusion after obstetric complication accounted for 66.9% (309/450) of the patients. The transfusion requirement expressed was of 11.6% (103/886) in first trimester haemorrhages 53.5% (69/129) in third trimester haemorrhages and 21.8% (107/489) in post-partum. The frequency of transfusion indications was of 5.7% for caesareans (130/2251).

Table 2. Obstetric complications of transfusion indications.

Obstetric complications	Number of patients	Percentage
Post-partum haemorrhage	107	23.8%
Chronic anaemia	93	20.7%
Post-abortum haemorrhage	68	15.1%
Post-caesarean haemorrhage	42	9.3%
Broken extra-uterine pregnancy	35	7.8%
Retro-placental haematoma	31	6.9%
Haemorrhagic placenta praevia	24	5.3%
Serious malaria	19	4.2%
Haemorrhagic endometritis	17	3.8%
Uterine rupture	14	3.1%
Total	450	100%

3.2 Epidemiological characteristic of patients requiring transfusion

The average age of the patients is 26.1 years, with extremes of 15 and 45 years. Patients between 20 and 29 years old represented 57.8% of the population. The mean parity of our patients was of 1.8. In our series 339 women, i.e. 75.8% (339/447) were in the sector 30 hospital health district the remainder came from other districts of the city of Ouagadougou as well as rural departments. The patients were admitted under the emergency reference mode for 74.5% (335/450) of women.

3.3 Evaluation of the degree of anaemia via a haemoglobin level assay

Haemoglobin levels were below 6g/dl in 241 women, i.e. 58.5% (241/412). The mean haemoglobin level was of 5.7 g/dl [1.7-11.2]. The study of the degree of anaemia according to the prenatal follow-up demonstrated that women who had less than two prenatal consultations presented a significantly higher anaemia (65.7%) than those who had more than two prenatal consultations (51.9%), $p = 0.02677$. The clinical context was marked by the obstetric complications presented in table 2.

3.4 Transfusion aspect

3.4.1 Coverage of transfusion requirement

Among the 450 patients concerned by our study, 380 benefited from a blood transfusion thus the transfusion

Table 3. Distribution of causes of non-covered requirements found in 63 patients.

Causes	Number of patients	Percentage
Blood not available	47	74.6
Blood tests not available	6	9.5
Patient's condition (hyperthermia, venous route impossible)	6	9.5
Ambulance not available	1	1.6
Support personnel not available	1	1.6
Transfusion not available	1	1.6
Discharge against medical opinion	1	1.6
Total	63	100.0

requirement was covered to 84.4% (380/450). The totally covered transfusion requirements represented 52.6% (200/380) and partially covered in 47.4% of cases (180/380). There were 70 patients who did not receive any transfusion; therefore there was a non-covered transfusion requirement of 15.6% (70/450). The total number of blood bags requested was 1226 of which 70.1% (860/1226) were provided and 29.9% (366/1226) were not provided. The number of bags transfused was 835 i.e. 68.1% (835/1226). Thus 25 bags provided were not transfused to our patients (2.9%).

3.4.2 Causes of non-covered requirements

Table 3 presents the distribution of 63 causes of non-covered requirements.

3.4.3 Pertinence of the blood transfusion

The indication of the transfusion was pertinent in 89.3% (402/450) of cases. It responded to a haemoglobin level lower than 6g/dl for 241 patients i.e. 53.6% (241/450) of the women; a cataclysmic haemorrhage with signs of decomposition for 161 patients i.e. 35.8% (161/450) of the women. For 10.7% of the patients (48/450), no pertinence criterion of the transfusion was found.

3.4.4 Type of blood product transfused and quantity

The patients transfused received in total 835 blood bags which were distributed as indicated in table 4.

Table 4. Distribution of the quantity of bags per labile blood product transfused in 380 patients.

Causes	Number of patients	Percentage
Total Blood	200	24.0
Red blood cell concentrate	584	69.9
Fresh frozen plasma	51	06.1
Total	835	100.0

3.4.5 Post-transfusion haemoglobin level

An assay of the post-transfusion level was performed for 211 women. It was <6g/dl in 28 patients (13.3%); comprised between 6 and 11g/dl in 179 patients (84.8%) and >11g/dl in 4 patients (1.9%). The mean post-transfusion haemoglobin level was of 7.3 g/dl [2.7-13.3]. It was performed within less than 48 hours in 11.4% of patients and within 48 hours or more in 88.6%. The average haemoglobin gain was of 2.3g/dl.

3.4.6 Maternal prognosis

A transfusion incident or accident occurred in 31 patients i.e. 8.2% of 380 women transfused. 12 transfusion incidents consisting in the following were revealed: 7 coagulated blood bags; 3 cases of incomplete labelling of blood bags; 1 group error; 1 case of agglutination in the pre-transfusion compatibility test. There were 19 transfusion accidents including one death. The distribution of patients who had a non-fatal transfusion accident is presented in table 5.

During our study period, 67 cases of maternal deaths were recorded in the district hospital maternity including 18 that occurred in patients with a transfusion requirement i.e. 26.9% (18/67). The mortality rate of 450 patients with transfusion requirements was of 4% (18/450) of which 8 took place in the total absence of blood for a transfusion, 7 for insufficient compensation of blood loss, 2 for delay in the transfusion in patients in haemorrhagic shock, 1 patient died following a transfusion error. The majority of these deaths i.e. 66.7 % occurred less than 24 hours after admission. Out of the 380 transfusion performed; there was one death due to transfusion error, i.e. a post-transfusion lethality of 0.3%. The study of maternal mortality according to the coverage of the need showed that the mortality was significantly higher among women with a non-covered transfusion need i.e. 11.4%, $p = 0.0005$. Maternal mortality was of 2.6% for the women for whom the need had been satisfied.

4 Discussion

4.1 Frequency of transfusion indications

During our study, the transfusion indications represented 5.8% of admissions for birth. The transfusion requirement

Table 5. Distribution of post-transfusion mortality in 18 patients.

Transfusion accidents	Number of patients	Percentage
Hyperthermia	5	27.8
Shivering	5	27.8
Urticaria	4	22.3
Shivering-hyperthermia syndrome	2	11.1
Acute pulmonary oedema	1	5.5
Chest pain	1	5.5
Total	18	100.0

expressed for third trimester haemorrhages was of 53.5%. This level is similar to that found by Nanema, 53.6% at the Centre Hospitalier Universitaire –Yalgado Ouédraogo (CHU-YO) [1]. Concerning post-partum haemorrhages, the level was of 21.8%. It is certainly lower than that observed by Sanon [2] at the CHU-YO (52%) but also reveals how high the transfusion requirements in obstetrics were in the sector30 district hospital. In Morocco, blood transfusion indications are less common. Znibar [3] recorded 145 cases of blood transfusion for 25,911 births that took place between 2001 and 2003 at the CHU Casablanca, i.e. a frequency of 0.5%. In France, obstetric blood transfusion incidence is also low; Cur and Pellicer [4] revealed a level of 1% to 2.5% in peri-partum. This could be related to a lower frequency of deficiency or parasitic origin anaemias favoured in our context by the low socio-economic life level and malaria. Chronic anaemia represents almost a quarter (24.9%) of our transfusion indications and 58.3% of typed anaemias were microcytic or hypochromic suggesting an iron deficiency. The frequency of transfusions after a caesarean was of 5.7% in our series. It was higher than that observed in Tunisia by Trabelsi (0.56%) [5]. Our level was also higher than that found in France by Andreu [6] 3.1% as well as Lahmy-Deddouch [7] 1.95% in 2007. The lack of monitoring of operated patients due to insufficient personnel is one of the causes.

4.2 Analysis of transfusion requirements not covered

The non-covered requirement in our series was of 15.6%. This level is close to that of Windsour [8] at the CHU-YO and Sepou [9] in Banqui who found a non covered requirement of 14.8% and 18.7%. However, Lankoande [10] as well as Nanema [11] recorded higher levels of 52.6% and 32%. Pambou in Brazzaville [11] and Kone in Abidjan [12] also found higher levels than ours with 42% and 32.1%, respectively. Finally, for Saizonou [13] in Benin, the non-covered requirement was of 25.4% in case of haemorrhage and 68% in case of chronic anaemia. This difference could be attributed

to a better blood collection in Burkina Faso, with the set up of a national blood transfusion centre in 2002, which has improved with time [14]. It should also be noted that the emergency obstetrics care offer system organised in sector 30 district hospital with the treatment of patients in emergency situation without pre-payment, a operating room and laboratory functioning 24 hours a day and the creation of a labile blood product (LBP= distribution bank in 2009). However, the remaining difficulties should not be kept hidden because while the offer is increasing the demand is also increasing with a non-covered requirement in terms of blood bags of 29.9%. The limited storage of LBP over time and the fluctuations in transfusion requirements throughout the year also add to the problem of the suitability between the offer and the demand. In Burkina Faso, the high demand during the winter season (malaria period) is faced with the unavailability of the major blood donors, i.e. students, who are on holiday during this period. Attaining a better coverage level such as in Morocco, where Houda [15] found a transfusion required covered to 100%, or in developed countries which carry out 65% of the world blood collection [16] requires more efforts at the CNTS of Burkina Faso.

4.3 Pertinence of the transfusion in our series

The indication of the transfusion was pertinent in 89.3% of cases. It corresponded to a haemoglobin level below 6g/dl for 241 patients i.e. 53.6% of the women. For the other patients, presenting a haemoglobin level greater than or equal to 6g/dl, the transfusion was generally prescribed after the occurrence of a patent haemorrhage with acute anaemia intolerance signs (35.7%). However, in 10.7% of cases the transfusion indication was not justified. In fact the transfusion which should correspond to a real requirement (severe anaemia, shock condition, intolerance sign) was sometimes prescribed in the expectation of a haemorrhage that had not occurred or for personal use purposes (by certain health agents) of the blood bags obtained. Thus, 25 bags provided were not transfused to our patients. These blood bags not used appropriately or which were not usable because they were stored for longer than the normal shelf-life; bring up the question of the rational use of the blood. The abuse of this therapy, which is scarce, contributes to increase the non-covered requirement levels. The equipment of our maternities in emergency haemoglobin level control equipment (Hemocue) could allow a better evaluation of the transfusion requirements of mothers to be and thus contribute to a more pertinent indication of transfusions.

4.4 Maternal prognosis

The use of blood transfusions must be limited to the essential as it still causes a non-negligible number of accidents and complications. In the literature, the current risk of occurrence of a transfusion error is of 1 out of 1000 to 1 out of 10,000 transfusions with a mortality rate of 10% [17]. We observed one case of fatal transfusion error during our study. This death occurred after a caesarean complicated by a post-operative haemorrhage which required an emergency blood transfusion. Following an identification error, a blood bag intended for a

namesake was transfused to the patient. Seventeen minutes after the start of the transfusion a reaction with shivers, dyspnoea and sweating appeared. The termination of the transfusion and the administration of cortisone were not able to prevent the death which occurred within less than an hour due to respiratory and cardio-circulatory failure. This case is a reminder of the need to comply with the transfusion process after a final verification of the compatibility at the bed of the patient even in an emergency situation. In Canada [18] 6 cases of transfusion errors were found in a haemovigilance study performed in 2006. However, these errors did not cause the cases of death observed, of which two were attributed to a volemic overload. In our study volemic overload was observed in a patient, causing an APO with a favourable outcome. Hyperthermia and/or shivers (66.7%) and urticaria (22.3%) were the main clinical manifestations associated with transfusion accidents in our series. The same applied in the Canadian study, with a frequency of 47% for hyperthermia and/or shivers and 17.3% for urticaria [18]. Therefore, the strict compliance with transfusion rules must be emphasised as well as the regular monitoring of patients transfused to detect the slightest sign of intolerance. The concept of haemovigilance also involves the information of health agents about the importance of post-transfusion follow-up. In our hospital efforts have been made at this level as a multi-disciplinary haemovigilance committed has been organised encouraged by the CNTS. The maternal prognosis for life was significantly more favourable in the group of women with a covered transfusion requirement than in the group with non-covered requirements ($p=0.00056$). The rate of mortality of patients with transfusion requirement was of 4% in our series. Kone [12] in Abidjan as well as Lankoandé [19] and Windsouri [8] found higher rates at 13.8%, 13% and 10.7%. This difference could be explained by the context of our study. The study was performed within a district hospital which refers to the hierarchy according to the care requirements. Therefore, it is partly understandable that the mortality rate is lower compared to that of the other authors who carried out their study within university hospital centres.

5 Conclusion

The frequency of transfusion in obstetrics is related to the incidence of haemorrhages and chronic anaemia which are still very present in our poverty and high natality context. The reduction of these obstetric complications requires an increase in the interest for prevention policies and the treatment of anaemia as well as the systematic implementation of good birth giving practices. The non-covered requirements were high and a source of mortality. Actually, the lack of blood was revealed to be in our series to be determining factor in the maternal prognosis. Transfusions are not commonplace events. With a high level of transfusion incidents and accidents, our study is a reminder of the importance of complying with transfusion safety rules.

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