Immediate Postpartum Haemorrhage at the Libreville University Hospital Centre: Epidemiological Profile of Women

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Abstract

Introduction

In Gabon, the frequency of maternal deaths directly related to Immediate PostPartum Haemorrhage (IPPH) is 15 to 25%, despite the different means that World Health Organization (WHO) has made available to the providers of the Emergency Obstetrical and Neonatal Care (EmONC). The objective of this study was to determine the prevalence and epidemiological characteristics of IPPH in order to improve its management and reduce the rate of maternal deaths.

Methods

An analytical retrospective study involved 42,728 records, whose data were collected using a chart collection form on the basis of information contained in partograms and other patient records. The description of the sample is made using numbers and proportions. The relationship between the etiologies of IPPH and certain characteristics of the women was established using the ORs with their 95% confidence interval. The difference was significant if p < 0.05.

Results

The prevalence of IPPH was 1.6%. The 20-39 age group was the most represented. Multiparous women accounted for 67.2%. Delivery hemorrhages accounted for 65.5% of IPPH. The main factors associated with delivery hemorrhages were multiparity (p<0.001), preterm and postterm (p<0.001), and child weight >4,000 g (p<0.001). Those associated with genital track injuries were young maternal age, multiparity (p<0.001).

Conclusions

The prevalence of IPPH was 1.6%. The most common etiology was hemorrhage from delivery. Multiparity remains the most common risk factor and the young age of the patients. It is important to improve management through better assessment of blood loss in the immediate postpartum as well as capacity building of health providers on EmONC.

Plain English Summary

Postpartum haemorrhage remains the main cause of maternal death throughout the word particularly in developing countries. The majority of these deaths are preventable when there is adequate management of IPPH. This study, which took place at the level of a reference hospital, allowed us to characterize IPPH with its causes and risk factors.

Over a period of time, we have identified 42728 childbirth cases, among which there are 671 cases of IPPH. The majority of parturients (n = 584/671) had arrived at the University Hospital Centre on their own and by their own efforts, 87%. There are two main categories of causes of IPPH, including delivery
haemorrhages dominated by retroplacental haematoma and placenta previa, and trauma to the genital tract.

We observed that primigravidae such as primiparous (p < 0.001), multigravidae (p < 0.001) as well as multiparous (p = 0.047) women had a lower risk of IPPH compared to women with 2–3 pregnancies or 2–3 children. Women with preterm (p = 0.005) and postterm (p < 0.001) births were more likely to have IPPH than women with full-term births. In contrast, women with duration of labour more than 12 hours had significantly more IPPH than women with less than 12 hours.

Factors associated with genital tract trauma were being 14–19 years of age (p < 0.001), pauciparum (p < 0.001), full-term delivery (p < 0.001) and having a child weighing between 2500–4000 g (p < 0.001).

**Introduction**

Immediate postpartum hemorrhage (IPPH) is defined as the loss of 500 mL or more of blood within 24 hours of delivery (1–3). In developing countries and sub-Saharan Africa, it is the leading direct cause of maternal death (2, 4, 5, 6, 7). In Gabon, the frequency of maternal deaths directly related to IPPH is clearly increasing at the Libreville University Hospital Centre. It increased from 15–25% between 2013 and 2015 (8), despite the various means that WHO has made available to EmONC providers such as the implementation of recommended protocols on the management of postpartum haemorrhage. Some of these deaths were preventable (9–11). The objective of this study was to determine the prevalence and epidemiological characteristics of IPPH at Libreville University Hospital Centre with the aim of improving its management and reducing the rate of maternal deaths.

**Methods**

**Purpose and type of study**

This was an analytical retrospective study over a 5-year period from January 1, 2010 to December 31, 2014, based on the systematic collection of immediate postpartum hemorrhage case files that occurred during this period. The study took place in the Department of Gynecology and Obstetrics of the University Hospital Centre of Libreville.

**Study Population And Sampling**

The study population is represented by all parturients admitted to the Department of Gynaecology and Obstetrics during the study period, n = 42728. Included were all vaginal deliveries and cesarean deliveries with immediate postpartum hemorrhage. Not included were deliveries with late postpartum hemorrhage, postabortion hemorrhage, and rectorrhage or hematuria. All the records of parturients admitted to the Gynaecology and Obstetrics Department of the University Hospital Centre of Libreville who had presented an immediate postpartum haemorrhage and who were registered were collected. The data were collected...
using a collection form. The form was filled in on the basis of information contained in partogrammes, birth registers, operative report registers, anaesthesia and reanimation registers and hospitalization registers.

**The Variables**

The variables studied were sociodemographic characteristics, obstetric and gynecological history of the woman, characteristics of the pregnancy, the conduct of delivery, and the etiologies of hemorrhage.

**Data Analysis**

The data was entered into an Excel database and analyzed using SPSS version 22. The sample is described using numbers and proportions. The relationship between the etiologies of IPPH and certain characteristics of the women was established using the ORs with their 95% confidence intervals. The difference was significant if p < 0.05.

**Ethical Considerations**

The study has received the approval of the ethics committee and an authorization from the Direction of the University Hospital of Libreville.

**Results**

During the study period, 42,728 birth records were collected, with a prevalence of immediate postpartum hemorrhage of 1.6% (n = 671).

**Socio-demographic Characteristics Of Women**

The age of parturients ranged from 14 to 46 years with a mean age of 26.9 ± 6.6 years. The 20–39 age group was the most represented with just over half of the parturients (n = 337). The majority of patients were housewives or women without paid employment (n = 293) and students (n = 156/202). Other characteristics of the women are presented in Table 1.
### Table 1
Socio-demographic characteristics of women

| Variables          | Numbers | Percentage (%) |
|--------------------|---------|----------------|
| Age (years)        |         |                |
| 14–19              | 100     | 14.9           |
| 20–39              | 542     | 80.8           |
| 40                 | 29      | 4.3            |
| Profession         |         |                |
| Household          | 302     | 45.0           |
| Student            | 202     | 30.1           |
| Public servant     | 167     | 24.9           |
| Marital status     |         |                |
| Single             | 622     | 92.7           |
| Married            | 49      | 7.3            |
| Educational level  |         |                |
| Without education  | 01      | 0.1            |
| Primary /secondary | 567     | 84.5           |
| Superior           | 103     | 15.4           |

### Women's Gynecological-obstetric History

Table 2 presents the participants' gynecological and obstetrical history. Slightly more than half (n = 341/671) of the parturients (50.8%) had no gynecological history at all. In the other half, abortion (n = 301/330) was found in the majority, followed by extrauterine pregnancy and in utero fetal death.
Table 2
Pregnancy and childbirth characteristics of women at Libreville University Hospital

| Variables                                      | Numbers | Percentage (%) |
|------------------------------------------------|---------|----------------|
| Surgical history                              | 671     |                |
| Cesarean section                              | 07      | 1.1            |
| Salpingectomy                                 | 05      | 0.7            |
| None                                           | 659     | 98.2           |
| Gynecological history                         | 671     |                |
| Abortion                                       | 301     | 44.9           |
| Extra uterine pregnancy and other antecedents | 13      | 1.9            |
| No history                                     | 357     | 53.2           |
| Gesture                                       | 671     |                |
| 1                                              | 167     | 24.9           |
| 2–3                                            | 216     | 32.2           |
| ≥ 3                                            | 288     | 42.9           |
| Parity                                         | 671     |                |
| 1                                              | 220     | 32.8           |
| 2–3                                            | 279     | 41.6           |
| ≥ 3                                            | 172     | 25.6           |
| Gestational age at delivery                    | 671     |                |
| Term                                           | 393     | 58.6           |
| Pre-term                                       | 224     | 33.4           |
| Post term                                      | 54      | 8.0            |
| Types of pregnancy                            | 671     |                |
| Mono fetal                                     | 654     | 97.5           |
| Twin                                           | 17      | 2.5            |
| Starting labour upon arrival                   | 671     |                |
| Immediate                                      | 345     | 51.4           |

*: 17 twin pregnancies
| Variables                  | Numbers | Percentage (%) |
|---------------------------|---------|----------------|
| After 3 hours             | 326     | 48.6           |
| Duration of labour        | 671     |                |
| ⩾ 12 hours                | 636     | 94.8           |
| ⩽ 12 hours                | 35      | 5.2            |
| Method of delivery        | 671     |                |
| Caesarean section         | 346     | 51.6           |
| Vaginal delivery          | 325     | 48.4           |
| Extraction mode           | 671     |                |
| Without instrument        | 664     | 97.8           |
| Forceps                   | 07      | 2.2            |
| Mode of delivery          | 671     |                |
| Artificial                | 386     | 57.5           |
| Directed                  | 276     | 41.2           |
| Spontaneous               | 9       | 1.3            |
| Birth weight (g)*         | 688     |                |
| ⩾ 2500                    | 193     | 28.1           |
| 2500–4000                 | 479     | 69.6           |
| ⩽ 4000                    | 16      | 2.3            |

*: 17 twin pregnancies

**Characteristics Of Pregnancy And Childbirth**

Prenatal follow-up was carried out by 647 parturients, or 96.4%. Among those who had performed prenatal follow-up and whose records mentioned it, near ¾ (n = 478/647) had performed at least 4 prenatal visits, or 73.9%. The remaining quarter (n = 169 or 26.1%) had made between 1 and 3 prenatal visits.

Of those who had completed prenatal follow-up, more than three-quarters (n = 498/647) had been followed by a midwife for prenatal visits, or 77%. Of the remainder, some (n = 139 or 21.5%) had been followed by a gynecologist, while the records of the others did not specify the provider of the antenatal
visits. Among the records studied, twin pregnancies (n = 17) concerned 2.5% of parturients, while mono-
fetal pregnancies (n = 654) concerned 97.5% (Table 2).

The majority of parturients (n = 584/671) had arrived at the University Hospital Centre on their own and 
by their own efforts, 87%. The remaining patients (n = 8) or 13% had been referred from other facilities. 
More than half of the parturients (n = 345) were not in labour when they were admitted, 51.4%. The other 
half (n = 326) had been in labour for an average of three hours. Extended work of at least 13 hours was 
found in 5.2% of parturients (n = 17).

Etiologies Of Immediate Postpartum Hemorrhage

The main etiology of this study was hemorrhage of delivery in 65.5% of parturients, the majority of whom 
had a placental insertion defect (n = 311/439). Genital tract trauma was found as a second etiology (n = 
402), with cervical lacerations (n = 176/402) being the main cause. No pathology of haemostasis had 
been identified (Table 3).

| Etiologies                        | Number | Percentage (%) |
|----------------------------------|--------|----------------|
| **Hemorrhages of deliverance**   |        |                |
| Placental abruption              | 24     | 3.6            |
| Placenta praevia                 | 113*   | 16.8           |
| Retroplacental hematoma          | 199*   | 29.7           |
| Uterine atony                    | 103    | 15.4           |
| **Trauma of the genital tract**  |        |                |
| Cervical laceration              | 176    | 26.2           |
| Vaginal laceration               | 96     | 14.3           |
| Perineal laceration              | 44     | 6.6            |
| Vulvar laceration                | 4      | 0.6            |
| Uterine rupture                  | 28     | 4.2            |
| Episiotomy                       | 54     | 8.0            |
| Coagulation disorder             | 0      | 0              |
| **Total**                        | 671    | 100.0          |

*: One parturient presented with both retroplacental hematoma and placenta previa.

Risk Factors For Immediate Postpartum Hemorrhage
The etiologies of immediate postpartum hemorrhages were delivery hemorrhages and genital tract trauma.

We observed that primigravidae such as primiparous ($p < 0.001$), multigravidae ($p < 0.001$) as well as multiparous ($p = 0.047$) women had a lower risk of IPPH compared to women with 2–3 pregnancies or 2–3 children. Women with preterm ($p = 0.005$) and postterm ($p < 0.001$) births were more likely to have IPPH than women with full-term births. This was similarly the case for women with children weighing < 2500 g and ≥ at 4000 g. In contrast, women with duration of labour more than 12 hours had significantly more IPPH than women with less than 12 hours (Table 4).
| Variables          | Deliverance hemorrhage | Genital tract trauma |
|-------------------|------------------------|----------------------|
|                   | Yes  | No  | OR (CI 95%) | p   | Yes  | No  | OR (CI 95%) | p   |
| Maternal age      |      |     |             |     |      |     |             |     |
| 14–19             | 78   | 22  | 0.83(0.49–1.40) | 0.49 | 97   | 3   | 11.26(3.51–36.09) | <0.001 |
| 20–39             | 439  | 103 | 1.00        | -   | 402  | 140 | 1.00        | -   |
| 40 +              | 21   | 8   | 0.61(0.26–1.43) | 0.255 | 25   | 4   | 2.18(0.74–6.36) | 0.145 |
| Gestur e          |      |     |             |     |      |     |             |     |
| 1                 | 40   | 127 | 0.20(0.13–0.32) | <0.001 | 70   | 97  | 1.00        | -   |
| 2–3               | 131  | 85  | 1.00        | -   | 79   | 137 | 0.80(0.53–1.21) | 0.287 |
| 4+                | 96   | 192 | 0.32(0.22–0.47) | <0.001 | 92   | 196 | 0.65(0.44–0.96) | 0.032 |
| Parity            |      |     |             |     |      |     |             |     |
| 1                 | 39   | 181 | 0.01(0.00–0.02) | <0.001 | 120  | 100 | 1.00        | -   |
| 2–3               | 265  | 14  | 1.00        | -   | 196  | 83  | 1.97(1.36–2.85) | <0.001 |
| 4+                | 155  | 17  | 0.48(0.23–1.00) | 0.047 | 20   | 133 | 0.13(0.07–0.22) | <0.001 |
| Gestationnel age  |      |     |             |     |      |     |             |     |
| Before term       | 116  | 108 | 1.60(1.15–2.22) | 0.005 | 99   | 125 | 1.00        | -   |
| Term              | 158  | 235 | 1.00        | -   | 248  | 145 | 2.16(1.55–3.02) | <0.001 |
| Variables               | Deliverance hemorrhage | Genital tract trauma |
|------------------------|------------------------|----------------------|
|                        | Post term              |                      |
|                        | 74                     | 17                   |
|                        | 6.47(3.68–11.38)       | <0.001               |
|                        | 35                     | 56                   |
|                        | 0.79(0.48–1.29)        | 0.350                |
| Duration of labour     |                        |                      |
| ≤ 12 h                 | 377                    | 259                  |
|                        | 1.00                   | -                    |
|                        | 469                    | 167                  |
|                        | 1.28(0.62–2.68)        | 0.555                |
| 12 h +                 | 31                     | 4                    |
|                        | 5.32(1.86–15.26)       | <0.001               |
|                        | 24                     | 11                   |
|                        | 1.00                   | -                    |
| Birth weight           |                        |                      |
| < 2500 g               | 100                    | 93                   |
|                        | 2.72(1.92–3.86)        | <0.001               |
|                        | 96                     | 97                   |
|                        | 1.00                   | -                    |
| 2500–4000              | 357                    | 122                  |
|                        | 1.00                   | -                    |
|                        | 389                    | 90                   |
|                        | 4.37(3.04–6.28)        | <0.001               |
| > 4000                 | 4                      | 12                   |
|                        | 8.78(2.78–27.73)       | <0.001               |
|                        | 11                     | 5                    |
|                        | 2.22(0.74–6.64)        | 0.143                |

Factors associated with genital tract trauma were being 14–19 years of age (p < 0.001), pauciparum (p < 0.001), full-term delivery (p < 0.001) and having a child weighing between 2500–4000 g (p < 0.001). On the contrary, multiparous women were less likely (p < 0.001) to have a genital tract trauma (Table 4).

**Discussion**

During data collection, we were confronted with the inherent limitations of any retrospective study: incomplete anamnestic information; non-exhaustive paraclinical explorations; missing medical dossiers (poor management of archives). In spite of these constraints, we feel that we have determined the epidemiological aspects of immediate postpartum hemorrhage at the University Hospital Centre (UHC). This hospital and mono-centric survey does not reflect the epidemiological reality at the level of the whole country. However, it is an advocacy tool to improve the filling out and maintenance of admission and follow-up records in the delivery room.

**Prevalence Of Ipph**

The prevalence of immediate postpartum hemorrhage was 1.6%. While this prevalence varies from 0.86–9.0% according to studies reported in some countries (5, 7, 12, 13, 14, 15, 16, 17, 18). In population-based
studies, the incidence of PPH is around 5% of deliveries when blood loss is not accurately measured, and around 10% when blood loss is accurately measured (19). The variation in prevalence for our case during these years could be explained by the fact that not all cases of hemorrhage were reported in the registries. This was due to some low-level hemorrhages that went unnoticed and the fact that this notion had not always been reported in the obstetrical records of the patients because of the burden of work. In addition, the census of maternal deaths at the hospital did not begin until 2014.

**Socio-demographic Characteristics**

The sociodemographic characteristics studied were age, occupation, marital status and educational level of women.

Women between the ages of 20 and 39 were more represented with more than 80% of the workforce. However, there are variations in age frequency noted in Norway, Tunisia, France and Chad (5, 13, 14, 15, 20). In a general review Deneux-Thenaux noted the same results (19). The high frequency of IPPH in this age group in our context could be explained by the fact that it corresponds to the period of increased female genital activity and fertility in the subregion. Any woman in the period of genital activity may be affected by immediate postpartum hemorrhage. Housewives and high school students were the most affected class with 45.0% and 84.5% respectively. This result could be explained by the fact that unemployment affects women almost twice as much as men in Gabon: 20 per cent compared to 11 per cent. The unemployment rate for young people under 30 years of age is 31% (21). IPPH seems to be more common among the disadvantaged strata, because of the inaccessibility of prenatal care and the management of the factors that contribute to it. And since the marital status of women aged 15–49 in Gabon is dominated by single and cohabiting couples (21), the study found that 92.7% of parturients were single.

**Women's Gynecological History**

The proportion of women with a history of cicatricial uterus was minimal, 1%, in contrast to that reported by Chouaki in the Democratic Congo, 30.4% (15). However, the proportion of women with a history of abortion was 45.6%. It has been recognized that curettage and Caesarean section are causes of placenta previa and placental retention, which are risk factors for IPPH (12, 13). The absence of a history of IPPH or toxemia gravidarum in the records reviewed is to be deplored. In the partograms there is no entry mentioning these antecedents, which may be the reason for their absence. Nevertheless, Firmin et al. mentioned a significance between the history of IPPH and its occurrence (17). Partograms also do not show the estimated amount of blood loss. A new method for estimating blood loss should be adopted, as Andrikopoulou has pointed out (22). We noted a frequency of IPPH in pauciparum and primiparum with respectively 37.7% and 32.8% against 25.6% in multiparum. The same trend has been observed by some authors where IPPH was more frequent in paucipares (13, 18). Higher frequencies of IPPH in primiparous women have been observed in some studies while they have also been observed in multiparous women.
as shown in studies in Madagascar and Norway (12, 13). These results show that the frequency of IPPH is as high in pauci pares as in primipares. This could be explained by the overuse of uterotonics in these parturients in order to speed up labour; the use of indigenous oxytocics at home, fetopelvic disproportions or prolonged labour in primiparous women are also incriminated.

Characteristics Of Current Pregnancy And Childbirth

There was no information on the modes and conditions of evacuation of these parturients, factors that may influence maternal and fetal management and prognosis. Pregnancies considered at term were the most observed and accounted for 53.1% and one third of deliveries were premature. In contrast to data from studies conducted in Madagascar and France, which found a higher frequency of full-term pregnancies than ours (14, 18). There is evidence that premature delivery can lead to placental retention complicated by delivery hemorrhage due to a cleavage defect between the placenta and the myometrium (23).

More than half of the parturients were not in labour when admitted. The other half had been in labour for an average of three hours and 5.2% of parturients had been in labour for at least 13 hours. In the dossiers explored, there was a lack of information concerning the profile of the staff who had taken immediate care of the parturients, as more than ¾ of women had gone directly to the hospital. Rakotozanany et al. showed that late referral and late management of parturients with IPPH are risk factors for maternal death (12). The majority of parturients had given birth by Caesarean section. In 2.2% of cases the extraction is done by forceps and an artificial delivery is done in 57.5% of cases. The frequency of these three procedures seems high since they are performed in the only reference hospital in the city that has an adequate technical platform.

Etiologies And Risk Factors For Immediate Postpartum Hemorrhage

Delivery haemorrhages accounted for 65.5% of IPPH, while genital traumas accounted for 59.9%. These delivery haemorrhages are dominated by retroplacental haematoma, placenta previa and uterine atony. Some patients presented with one or two selected causes at the same time. These results are almost similar to the results obtained by some authors who have noted that uterine atony is the main cause of IPPH and that genital tract wounds are responsible for about 1 in 5 cases of IPPH (19). Thus, three of the three can be associated. They may be associated with: a pathology of delivery mainly represented by uterine inertia and placental retention; a uterine or vaginal genital lesion or a pathology of haemostasis (24, 25).

The Hemorrhages Of Deliverance
The main risk factors for IPPH in the most recent population-based studies vary from one author to another (19). In our study, primigravida and multi-gestations on the one side and primiparous and multiparous on the other appeared to have a lower risk of developing delivery hemorrhage. While women with preterm and postterm births, those with more than 12 hours of labor and those with a birth weight of less than 2500 grammes and more than 4000 grammes had a higher risk of developing IPPH. Multiparity, a factor contributing to uterine atony, has a non-negligible proportion in our study. Also, the use of oxytocics in our environment is very common, which could explain the frequency of uterine atony. In the occurrence of postpartum hemorrhages after vaginal delivery, the role of placenta previa is classic. The haemorrhage can be explained by the difficulties of uteroplacental cleavage and above all by the difficulties of spontaneous haemostasis. Also, the women’s records did not allow us to note a history of IPPH.

Trauma Of The Genital Tract

In contrast to delivery bleeding, women aged 14–19 years are more likely to have genital tract trauma. These results are similar to those found in several studies (19). Indeed, this young age is exposed to lacerations of the cervix and perineum. We have also noted that women who have given birth at term, those who have children with a birth weight between 2500–4000 grammes and women who have given birth more than twice are more likely to have genital tract trauma. Still, in this study we have a proportion of 98.7% of women who underwent an artificial and assisted delivery; 51.6% of women had a caesarean section. These two factors are recognized as soft tissue tearing factors (26).

Conclusions

Immediate postpartum haemorrhage remains the most feared obstetric emergency in the delivery room, despite the existence of multiple management methods. The prevalence of immediate postpartum haemorrhage was 1.6%. The parturients with the highest risk of IPPH were young women aged between 20 and 39 years, unmarried and from an unfavourable socioeconomic background as housewives or schoolchildren, with a secondary school education and having had at least one abortion and given birth at least once. The most common etiology was hemorrhage from the delivery due to a placental defect. Trauma to the genital tract was the second etiology. Multiparity remains the most common risk factor. IPPH is still the leading cause of maternal mortality in Gabon and the rest of the world. This is why it is important to improve management by better assessment of blood loss in the immediate postpartum period with the use of collection bags, saving time in diagnosis and management, close monitoring of the parturient and systematic delivery. The three aspects of treatment are inseparable, justifying adapted multidisciplinary care (obstetrician, anaesthetist, resuscitator, biologist): hence the interest in strengthening the capacities of health providers in terms of EmONC.

Abbreviations
Declarations

**Ethical approval** : University of Health Sciences, Gabon approved this study

**Consent for publication** : Included in the submission system

**Availability of data and materials**

The datasets used and analysed during the current study available from the corresponding author on reasonable request. The datasets generated and/or analysed during the current study are not publicly available due to the promise made to health staff to keep the data confidential when they are questioned, but are available from the corresponding author on reasonable request.

**Competing interests** : The authors declare no conflict of interest

**Fundings** : None

**Authors’ contributions** :

NAL and SHW designed the study, wrote the protocol and text and supervised the data analysis. LAOO, FEYM, VNST and EOA participated in the drafting of the protocol, data analysis and text writing. AJK participated in text writing and proofreading. All authors have read and approved the manuscript and contributed equally.

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