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Characteristics, causes and treatment of postpartum haemorrhage in first and second pregnancies

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Block abstract

We investigated characteristics, causes and treatment of postpartum haemorrhage (PPH) in a random sample of 294 women's first and second pregnancies involving at least one PPH. Among 588 pregnancies, PPH affected 169 first pregnancies, 105 second pregnancies only and recurrent PPH affected 48 pregnancies. In 34% of PPHs, atony was the primary cause. Second pregnancy PPH involved increased pharmacological therapy, blood transfusion and median blood loss. It is important to ascertain PPH history in parous women and be prepared for PPH recurrence.

Introduction

Postpartum haemorrhage (PPH) is one of the leading causes of maternal morbidity and mortality. Recent research indicates that the incidence of postpartum haemorrhage and associated adverse outcomes in developed countries are increasing.[1],[2] Canadian and US studies suggest that such increases are driven by increases in uterine atony which is purported to be the cause of three-quarters of postpartum haemorrhages in high resource settings.[3 4] However, the accuracy of reporting of the cause of PPH has been questioned.[5]

Nulliparity and grand multiparity (≥5 births) have been demonstrated to be risk factors for PPH,[3 6 7] however where PPH occurs in a second pregnancy it is not known whether the aetiology and treatment differs from that in a first pregnancy. Furthermore, among women having a PPH, it is not clear whether a subsequent PPH involves more severe bleeding. The aim of this study was to investigate the characteristics, causes and treatment of PPH in first and second pregnancies.

Methods

We utilised data collected in a review of PPH among 294 women with first and second pregnancies (representing 588 pregnancy records) and at least one PPH. The details of this study are reported elsewhere.[5] Briefly, we selected a random sample of 600 first and second birth medical records for 300 women giving birth in New South Wales (2002-2006) where hospital data reported a PPH after either or both pregnancies.

Data were abstracted from delivery summaries, progress notes, operation and anaesthetic charts in medical records.

Postpartum haemorrhage was defined as blood loss of ≥ 500 mL following vaginal birth or ≥ 750 mL following caesarean section (ICD-10AM blood loss criteria)[8] or where a diagnosis of PPH was recorded in the medical record. Up to two causes of PPH could be identified in the abstracted data, with a primary cause identified where possible. No cause could be ascertained for 80 (24.8%) PPHs. Prophylactic oxytocin was recorded as part of active management of labour. Therapeutic pharmacological treatment included oxytocin or other pharmacological treatment initiated after bleeding to control blood loss.

Contingency table analyses are presented, with chi-square analyses used to report statistical significance at the $P < 0.05$ (two-tailed) level. Since blood loss data had a skewed distribution, medians are reported . Differences in blood loss were assessed with Wilcoxon Mann-Whitney tests and Wilcoxon signed rank sum tests. Ethics approval was granted by the NSW Population and Health Services Human Research Ethics Committee (HREC), the Northern Sydney Central Coast Area Health Service HREC, and individual ethics or patient care review committees.

Results

Of the 588 (294 first, 294 second) pregnancies, the majority were singleton births (98.3%) in public hospitals (81.3%). Three hundred and twenty-two births were followed by a PPH during the birth admission. Of 322 records with a PPH, 251 (78.0%) had a clinical diagnosis and 71 (22.0%) met the blood loss criteria lone.. Severe PPH (≥1000mL) occurred in 91 PPHs (28.3%).

One hundred and twenty one women had only a first pregnancy PPH, 105 women had only a second pregnancy PPH and 48 women (16.3%) had a PPH after both pregnancies. This represents a recurrence rate of 28.4%. The median blood loss at first pregnancy PPH was 700 mLs (range 200-2800) and at second pregnancy PPH (irrespective of haemorrhage history) was 800 mLs (range 200-4000; P=0.08). Forty percent (40.4%; N=19) of women having a recurrent PPH lost ≥1000mLs following their second PPH and for three-quarters of these women (74%; n=14) their second haemorrhage was more severe than their earlier haemorrhage (p=0.21).

Births in which a PPH occurred had the following characteristics (compared to non-PPH births): higher proportions of multiple births (2.8% vs 0.4%, P=0.03), primparous births (53.4% vs 46.6%), vaginal births (76.1% vs 65.8%, P=0.01), second stage of labour of ≥1 hour (among births with labour; 40.5% vs 32.2%), and obstructed labour (29.5% vs 18.2%, P=0.002). Most PPHs (91.7%) occurred within 1-2 hours of birth.

The most common primary cause of PPH at a first or second postpartum haemorrhage was uterine atony (35.5% and 32.0% of PPHs respectively). Atony and laceration (15.7% vs 9.3%) were more frequently identified as the primary cause at first PPH (compared to second PPH), whereas retained placenta (15.7% vs 18.7%) and placenta accreta/ increta/ percreta (1.2% vs 2.7%) were more common among second PPHs. However, differences were not statistically significant. The causes associated with the largest blood loss (≥1000mLs) were atony (first and second pregnancy PPH), and retained placenta (second PPH). Forty-four (44.4) percent of women with a first PPH related to uterine atony, went on to have a subsequent PPH with the same attributed cause, however this represented 8 out of 18 women. For other causes there was little correlation between the two pregnancies.

Ninety-one percent (91.4%) of PPHs that occurred after a vaginal delivery had evidence of active management of the third stage of labour. Oxytocin treatment at therapeutic doses followed third stage prophylactic oxytocic administration in 47% (range 33%-89% across hospitals) of PPHs post vaginal delivery, however there was variable recording of prophylaxis by hospitals with 2 hospitals not recording third stage prophylactic oxytocic use.

A higher proportion of second pregnancy PPHs were given pharmacological treatment, in particular an oxytocin infusion or bolus, than those occurring following a first pregnancy (Table 1). Similarly a higher proportion of manual removal of the placenta

and transfusions were performed following second pregnancy PPHs (Table 1). There were no uterine arterial ligations, embolisations, B-lynch sutures or hysterectomies documented in the study population. Among women with a recurrent PPH, 91% had pharmacological treatment of both haemorrhages. A blood or blood component transfusion was initiated following 31 (7.7%) PPHs. There were 2 transfusions recorded following pregnancies that were not recorded as having PPHs but which involved a haematoma and intra-peritoneal bleeding.

Discussion

Findings of this study indicate that the role of uterine atony as a primary cause of PPH may be over-estimated in some studies, that there are often multiple causes of PPH present and that PPH in subsequent pregnancies may potentially be more severe than a first PPH.

In our study, approximately one in three PPHs were primarily related to uterine atony, a lower proportion than reported in the USA or Canada where reporting is based on ICD coding,[3 4] but similar to that reported in France and Scotland.[9 10] Importantly, the non-specific ICD code for atony includes genital tract trauma[1] and our results indicate a likely over-estimation of atony based on use of this ICD code. In one quarter of pregnancies with a PPH in our study there were multiple causes present. This demonstrates the complexity in many cases of identifying the course of events

culminating in haemorrhage. We are not aware of other research that has investigated PPH cause in pregnancies with a history of PPH. Data from this study indicates that apart from atony, there was little correlation between PPH cause in subsequent pregnancies.

With one in three women having a recurrent PPH, awareness of both the fact and the precipitating cause of a prior haemorrhage should signal the need for preparedness in a subsequent pregnancy. The UK Royal College of Obstetricians and Gynaecologists recommend that for women presenting antenatally with a history of PPH, this history should be taken into account when discussing the setting for delivery.[11] Several studies have demonstrated that a prior haemorrhage increases the risk of a subsequent haemorrhage.[6 12 13] Our study demonstrated that for the majority of women having a subsequent haemorrhage (74%), the second haemorrhage involved larger blood loss. However, probably due to small numbers, this did not translate into a statistically significant difference in blood loss. In addition, the role of PPH prophylaxis should be discussed including active management of the third stage of labour, additional uterotonics, crossmatching and intravenous access. Screening for and treating iron deficiency anaemia, and ensuring timely access to an operating theatre if required are other strategies that can be used to limit the effect and amount of PPH.

The increased use of pharmacological therapy, higher median blood loss and trend towards increased transfusion among recurrent PPHs (compared to first pregnancy PPHs) may indicate a more severe PPH at second pregnancy. Increased proportions of pharmacological therapy and transfusion (whether or not a prior postpartum haemorrhage occurred) may also indicate a lower threshold to intervention in a second pregnancy.

Strengths of the study include the ability to investigate blood loss at subsequent pregnancies. The restriction to review of birth admission records means some secondary PPHs requiring readmission may have been missed. It is possible that the amount of blood loss is under-recorded since in many hospitals it is primarily based on visual estimation. [14]

Conclusion

Uterine atony remains a leading cause of primary PPH and there is some indication that a subsequent haemorrhage may also involve atony. Importantly, our study found a trend towards increased blood loss at a subsequent haemorrhage. These results highlight the importance of ascertaining pregnancy history in parous women and the need for prevention and preparedness for what is often an unexpected obstetric emergency for all pregnant women.

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Disclosure of interests

We have no conflicts of interest to report.

Contribution to authorship

JF and CR designed the study. JF conducted analyses of data and drafted the manuscript. CR and AS contributed to the interpretation of data and refinement of the manuscript.

Details of ethics approval

Ethics approval identification of medical records was granted by the NSW Population and Health Services Human Research Ethics Committee (HREC). Ethics approval for conduct of the study was granted by the Northern Sydney Central Coast Area Health Service HREC for public hospitals and individual ethics committees, patient care review committees or medical advisory committees for each of the private hospitals.

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Table 1. PPH treatment

	PPH in first pregnancy **N = 169** **N (%)**	**PPH in second pregnancy (no prior PPH)** **N=105** **N (%)**	**PPH in second pregnancy (prior PPH)** **N=48** **N (%)**
Pharmacological therapy*	137 (82.0)	86 (86.9)	45 (93.8)
Oxytocinon bolus/ infusion	129 (77.2)	85 (85.9)	44 (91.7)†
Ergometrine	30 (18.0)	16 (16.2)	8 (16.7)
Manual removal of placenta (among vaginal deliveries)	18 (13.1)	20 (27.8)†	10 (27.8)†
Other uterine procedures	13 (7.7)	7 (6.7)	1 (2.1)
Abdominal procedures	4 (2.4)	1 (1.0)	0
Transfusion of blood or platelets, fresh frozen plasma, cryoprecipitate	13 (7.7)	11 (10.5)	7 (14.5)

* Details of pharmacological treatment were not available for 8 PPH cases (2 first pregnancies and 6 second pregnancies); †denotes $p<0.05$; Other uterine procedures included exploration or other procedures in theatre, intra-uterine balloon and bimanual compression of the uterus; Abdominal procedures included exploratory laparotomy, evacuation of CS or pelvic haematoma and other procedures to control bleeding.