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Short Communication

Objective Measurement of Blood Loss following Vaginal Delivery in a UK Hospital

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Abstract

Background: Postpartum haemorrhage (PPH) is the leading cause of maternal morbidity and mortality worldwide. The reported incidence of PPH varies globally, which is often due to the use of subjective visual estimation of blood loss. The aim of this study was to measure the rate of PPH and severe PPH at a UK hospital using objective measurement of blood loss. **Methods**: Blood loss after vaginal birth was objectively measured in 2009 women at Birmingham Women's Hospital, UK using a blood collection drape. **Results**: The postpartum haemorrhage rate, defined as blood loss of 500 mL or more, was 22.2%. The severe PPH rate, defined as blood loss of 1000 mL or more, was 5.3%. **Conclusions**: The objective measurement of blood loss following vaginal birth is necessary for the accurate calculation of PPH rates.

Keywords: postpartum haemorrhage; severe postpartum haemorrhage; objective measurement

1. Introduction

Postpartum haemorrhage (PPH) is a common obstetric emergency and the leading cause of maternal morbidity and mortality worldwide. The World Health Organization defines PPH as a blood loss of 500 mL or more, and severe PPH as 1000 mL or more, regardless of the type of delivery [1]. PPH accounts for an estimated 27% of maternal deaths, with a woman dying due to PPH every seven minutes in low resource countries [2]. The rates of PPH and severe PPH appear to vary substantially around the world, and it is influenced by several factors, including maternal age, parity, mode of delivery, gestational age, prolonged labour, oxytocin augmentation, previous history of PPH, previous caesarean section, macrosomia, multiple pregnancy, placenta praevia, and underlying medical conditions such as anaemia [3].

The reported incidence of detected PPH following a vaginal delivery varies between 1% and 19% globally, and for severe PPH varies between 0.1% and 12% [4]. The highest rates of PPH are reported in sub-Saharan Africa, where PPH appears to affect up to 15% of women giving birth, while the lowest rates are reported in developed countries, such as Singapore and Austria, where the reported rates of detected PPH are around 1–2% [4].

An important weakness in most studies reporting the rate of PPH and severe PPH is that they have used subjective visual estimation of blood loss for detecting a PPH. Visual estimation relies on the healthcare provider's perception of the amount of blood that has been lost, which is known to underestimate the blood loss. An objective blood loss measurement allows for a more accurate assessment of the amount of blood loss [5]. Objective blood loss measurement refers to the quantification of blood loss through direct measurement, such as weighing blood-soaked pads or measuring the volume of blood collected in a container. Accurate measurement of blood loss using an objective method is crucial in the management of PPH, as it helps in the early detection of excessive bleeding and prompt intervention [6]. However, to date, there are very limited published data on the rates of PPH and severe PPH in the UK using objective blood loss measurement. In this short communication, we report the PPH and severe PPH rates in the UK based on a secondary analysis of data collected during a multi-country study that used an objective method for blood loss quantification at vaginal birth [7].

2. Methods

Written informed consent was taken for all women, and blood loss data were collected for 2009 vaginal births at Birmingham Women's Hospital, UK, between July 2015 and January 2018. Once the umbilical cord was clamped and cut and the amniotic fluid has been passed, a blood collection drape (BRASSS-V Drape) was placed under the woman's buttocks. Blood was collected for one hour, or for two hours if the bleeding continued beyond one hour. The drape with the blood was then weighed by a digital scale,

Table 1. Characteristics of women and babies at birth and blood loss after vaginal delivery.

Characteristic	N = 2009
Age (years), median (IQR)	29 (26, 33)
Nulliaprous, n (%)	813 (40.5%)
Gestational weeks, median (IQR)	39 (38, 40)
Labour induced, n (%)	971 (48.3%)
Labour augmented, n (%)	697 (34.7%)
Instrument-assisted vaginal delivery, n (%)	601 (29.9%)
Perineal trauma leading to suture, n (%)	1271 (63.3%)
Birthweight (g), median (IQR)	3325 (3000, 3660)
Baby alive, n (%)	2009 (100%)
Previous caesarean section, n (%)	138 (11.5%)
Previous postpartum haemhorrhage, n (%)	99 (8.3%)
Outcome	
Postpartum haemhorrhage ($\geq$500 mL), n (%)	446 (22.2%)
Severe postpartum haemhorrhage ($\geq$1000 mL), n (%)	106 (5.3%)
Blood loss (mL), median (IQR)	228 (106, 460)

IQR, interquartile range.

with the weight recorded in grams and then converted to volume (millilitres) after the weight of the drape was subtracted.

3. Results

The median age of women was 29 years (interquartile range (IQR) 26, 33) and the median gestational age at delivery was 39 weeks (IQR 38, 40). The proportion of women that had undergone caesarean section in a previous pregnancy was 11.5% (138/2009) and 8.3% had previously experienced PPH (99/2009). Labour was induced in 48.3% of women (971/2009), and augmented in 34.7% of women (697/2009) and 29.9% required assisted delivery (601/2009). All babies were born alive, and the median birthweight was 3325 g (IQR 3000, 3660). 63.3% of women suffered a perineal trauma that required suturing (1271/2009) (Table 1). The overall PPH rate was 22.2% (446/2009) and the severe PPH rate was 5.3% (106/2009). The median blood loss was 228 mL (IQR 106, 460) (Table 1). For women where labour was induced, the PPH rate was 23.5% (228/971) and the severe PPH rate was 5.5% (53/971), and for those where labour was not induced the respective rates were 21% (218/1038) and 5.1% (53/1038). For women where labour was augmented, the PPH rate was 28.8% (201/697) and the severe PPH rate was 6.5% (45/697), and for those where labour was not augmented the respective rates were 18.7% (245/1312) and 4.7% (61/1312). For women that required assisted delivery, the PPH rate was 41.3% (248/601) and the severe PPH rate was 10.5% (63/601), and for those where labour was not assisted the respective rates were 14.1% (198/1408) and 3.1% (43/1408).

4. Discussion

The rates of PPH and severe PPH reported in this study are higher than those reported using subjective measurement of blood loss. A recent cohort study of 101,339 women in France that used subjective assessment of blood loss reported much lower rates for detected PPH and severe PPH (2.7% and 0.7% respectively) [8]. These rates are likely grossly underestimating the actual blood loss. One minor limitation of weighing the blood collection drapes to provide a blood loss volume is that the density of blood clots is less than liquid blood [9]. However, other research groups have been able to validate a quantitative system for real-time measurement of blood loss using a blood collection drape in comparison to the drop of haemoglobin concentrations postpartum [10]. The vast majority of blood loss assessment following a vaginal birth is done subjectively, which leads to a gross underestimation of blood loss. This can result in PPH going undiagnosed and untreated, which culminates in maternal morbidity and mortality.

5. Conclusions

The rate of PPH and severe PPH in unselected women having vaginal birth in a UK hospital were 22.2% and 5.3% respectively. This UK data demonstrate the importance of objective measurement of blood loss to obtain valid estimates of PPH rates.

Availability of Data and Materials

Raw data were generated at Birmingham Women's Hospital. Derived data supporting the findings of this study are available from the corresponding author [AJD] on request.

Author Contributions

All authors were involved with the design and planning of this study. AC contributed substantially to the design, acquisition and interpretation of this work. CLE, MJP and MAI conducted the analysis. AJD wrote the first draft of the manuscript. All authors reviewed and provided feedback on the first draft of the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the East Midlands Leicester South Ethics Committee (approval number: REC 15/EM/0071).

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Conflict of Interest

The authors declare no conflict of interest.

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