

Effect of third stage of labour management approaches on the incidence of post-partum haemorrhage in women birthing at midwife-led units

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Acknowledgements: None declared.

Conflict of interest statement: The authors declare no conflict of interest.

Abstract

Background National/international guidelines advise active management of the third stage of labour. Studies conducted in obstetric-led units reveal evidence for reductions in primary postpartum haemorrhage (PPH) with active management compared to expectant management. The association in midwife-led units for low-risk women is relatively untested. **Aims** To examine the relationship between third stage of labour management approaches, and incidence of PPH (blood loss 500-1000mL) and severe PPH (blood loss >1000mL), in women birthing in midwife-led units. **Methods** Anonymised data was collected in 2015-16 from women birthing in England. Associations were assessed using adjusted logistic regression. **Findings** 59/765 women intending to receive active management and 71/508 intending to receive expectant management, experienced PPH ($p=0.015$). 14/765 women intending to receive active management and 16/508 intending to receive expectant management experienced severe PPH ($p=0.134$). **Conclusions** PPH, but not severe PPH, is higher in women birthing in midwife-led units intending to receive expectant management.

Acknowledgements

None declared.

Conflict of interest statement

The authors declare no conflicts of interest.

Introduction

Active management of the third stage of labour is advised by international and national third stage of labour practice guidelines and recommendations (NICE, 2017; RCM, 2018; RCOG, 2016; WHO, 2012; 2018). This is a result of evidence provided by research studies conducted in obstetric-led units, which have revealed evidence for a reduction in blood loss (primary postpartum haemorrhage, PPH) and treatment of this excessive blood loss after the birth of the baby with active management compared to expectant management (Begley et al. 2010; 2011a; 2015; de Groot et al., 1996; Prendiville et al., 2000; Prendiville et al., 1988; Rogers et al., 1998; Thilaganathan et al., 1993). However, research studies have reported many beneficial outcomes for healthy women at low risk of obstetric complications, who plan to give birth away from hospital obstetric-led units, particularly for women who choose to birth in midwife-led units (Brocklehurst et al, 2011; Hollowell et al, 2011; Hodnett et al, 2012; Christensen and Overgaard, 2017). Consequently, it has been suggested that the generalisability of these research studies and the guidelines, which they provide evidence, for may not be generalisable to women who have a normal physiological birth and choose to birth away from a hospital obstetric-led unit (Baker & Stepheson, 2022).

Literature review

A literature review by Baker and Stephenson (2022) revealed nine published research papers directly or indirectly comparing the incidence of PPH in women at low risk of PPH giving birth in midwife-led units, who receive either active or expectant management. A cohort study by Kataoka et al. (2018) found a significantly higher incidence of severe PPH with expectant management compared to active management. A study by Monk et al. (2014) also compared the incidence of severe PPH in midwife-led units compared to the obstetric-led units, finding no significant difference in incidence levels between unit types, despite an increased use of expectant management in the midwife-led units compared with the increased use of active management in the obstetric-led units. However, conversely, Fahy et al. (2010) found a significantly higher prevalence of PPH in women receiving active management conducted at a tertiary unit, consisting of an obstetric-led unit and an alongside midwife-led unit, compared with expectant management conducted at a freestanding midwife-led unit. Laws et al. (2017) found a higher prevalence of PPH in the obstetric-led units compared with midwife-led units despite an increased use of active management in the obstetric-led units, compared to an increased use of expectant management in the midwife-led units. Davis et al. (2012) also found that women, who had active management had a significantly increased incidence of severe PPH compared with women who received expectant management.

None of those nine studies identified by Baker & Stephenson were conducted in the UK and only two (Fahy et al., 2010; Davis et al., 2012) directly examined

the incidence of postpartum haemorrhage and active versus expectant management in women at low risk of postpartum haemorrhage, giving birth in midwife-led units. Davis et al. (2012), a large national study, only examined the incidence of severe postpartum haemorrhage (defined as blood loss of more than 1000 mL). Fahy et al. (2010) was a small-scale study in which the low numbers of women may limit the reliability, validity and generalisability of this study.

The aim of this present study was to address this gap in knowledge, using a retrospective cohort study to examine the relationship between active and expectant third stage of labour management approaches, and the incidence of PPH, (defined as blood loss of 500 mL or over, but under 1000 mL); or severe PPH, (defined as blood loss of 1000 mL or more), in women who had a normal birth in one of two midwife-led units, controlling for maternal BMI, maternal age and baby's birthweight as variables additionally identified as risk factors for PPH. Significant maternal morbidity and mortality can occur because of excessive bleeding during the third stage of labour or shortly after, from the uterus not contracting strongly enough after the birth of the baby. Hence reducing the incidence of PPH during the third stage of labour or shortly thereafter is an important issue that needs to be addressed to improve the wellbeing of the woman.

Methods

Setting

The study was conducted between 1st July 2015 and 30th December 2016 within an NHS Foundation Trust in Northwest England. The Trust provided

maternity care (community and hospital-based services) for women at high and low risk of complications during pregnancy, birth, and the postnatal period.

Hospital-based services included one antenatal and postnatal unit, two antenatal day units, a maternity assessment centre, an obstetric-led unit and two midwife-led units. The trust's birth centres (midwife-led units) consisted of an alongside and a freestanding midwife-led unit.

Women defined as at low risk of obstetric complications received antenatal and postnatal care from their community midwife. Women defined to be at high risk of obstetric complications received shared care by midwives and the obstetric team. Women at high risk of obstetric complications were advised to birth at the hospital's obstetric-led unit. Women at low risk of obstetric complications were given the option to birth at the obstetric-led unit, midwife-led units or at home. Occasionally, women at high risk of obstetric complications chose to birth at one of the midwife-led units or at home. Although the Trust advised these women at high risk to birth at the hospital obstetric-led unit, if the woman made an informed choice to birth at one of the midwife-led units or at home, the Trust supported her choice.

Women who laboured and birthed on the midwife-led units received care in labour and during the birth by a midwife. If any complications occurred during labour or postnatally, the woman was then transferred to the obstetric-led unit for assessment and further treatment by the obstetric staff and cared for by them and rest of the maternity care team. The midwives who provided care for the women on the midwife-led units were not known to the women professionally before labour started.

Third stage of labour management

Care provided by midwives during the third stage of labour was based on the Trust's third stage of labour guideline, based on national and international guidelines (NICE, 2014; WHO, 2012) at the time the study was conducted. These guidelines recommended active management of labour for all women. The Trust's guideline defined active management of the third stage of labour as administering an uterotonic drug with the anterior shoulder or as soon as possible after the birth of the baby and before the cord was clamped and cut. The uterotonic drug consisted of syntometrine given by intramuscular injection. However, if the woman had raised blood pressure, or the midwife was unable to monitor the woman's blood pressure, oxytocin by intramuscular injection should be administered. In active management, the administration of a prophylactic uterotonic drug is given to accelerate the contractility of the uterus and to prevent excessive blood loss.

After administering the uterotonic drug the cord should be clamped and cut. The cord should not be clamped and cut earlier than 1 minute after the birth of the baby, unless there were concerns about the integrity of the cord, or the baby's heart rate was below 60 beats per minute and not getting faster. Ideally, the cord should be clamped and cut within five minutes of the birth of the baby. However, if the woman wanted the cord to be clamped and cut later than 5 minutes, she should be supported in her choice. Controlled cord traction, to deliver the placenta, should be carried out after signs of placental separation.

Expectant management was defined in the Trust's guideline as no routine use of uterotonic drugs, no clamping of the cord until pulsation has stopped and delivery of the placenta by maternal effort. In addition, women should be advised to convert to active management if their third stage blood loss becomes excessive, the placenta is not birthed within 60 minutes, or if there are concerns about the baby or the integrity of the umbilical cord or maternal request.

Regardless of management approach, the Trust guidelines commented that once the placenta has been delivered, it should, along with any blood loss from the third stage of labour, be collected in a receiver. If there are any pads or sheets underneath the woman that are blood-stained, they should be removed and replaced. Any blood loss during the third stage of labour, including blood-stained sheets and pads, should be weighed, to give an estimated blood loss. Weighing this blood loss is not always possible; for example, if the woman has a pool birth, then the blood loss in the pool must be estimated by the midwife.

Eligibility criteria

All women who had normal vaginal birth (unassisted vaginal birth following a spontaneous labour and birth at term between 37- and 42-weeks' gestation with a cephalic presentation of a single live baby) at the midwife-led units were included in the study.

Data collection and storage

Anonymised data for this study was collected from the computer-based password-protected maternity data records held by the Trust. Entries also included the woman's intended third stage management approach, identified by

the midwife providing her care, and the third stage management approach they used (treatment received). Any changes to intended management approaches, and any blood loss volume experienced by the woman during the third stage of labour were documented. Blood loss was assessed by midwives providing care for the woman by weighing any blood-stained sheets and pads and by visual estimation, as per Trust guidelines. Any deviation in care given from Trust guidelines was also documented.

Data was stored in line with the sponsoring University's recommendations and the Data Protection Act (Mullock and Leigh Pollet 1998; Data Protection Act 2018), and in accordance with NHS Trust's Research and Development Department protocols.

Data analysis

The sample was summarised descriptively, by intended management style and as a full cohort. Maternal antenatal characteristics recorded included: proportion with previous retained placenta, previous PPH due to hypertonic uterus, previous caesarean section, and existing uterine abnormalities; BMI, maternal age, and parity (number of previous pregnancies reaching viable gestational age of 24-weeks, including live births and stillbirths). Maternal intrapartum characteristics recorded included: duration of 1st, 2nd and 3rd stages of labour, birth weight of baby and incidences of trauma (1st, 2nd and 3rd degree tears).

Adjusted (controlled) logistic regression analyses were used to assess the effect of management approach on the outcomes of PPH and severe PPH, controlling for variables additionally identified as risk factors for PPH, including

maternal BMI (categorised as BMI of 35 kg/m² or above, and BMI up to 35 kg/m²); maternal age (categorised as aged over 40 years and aged up to 40 years) and baby's birthweight (categorised as over 4.0 kg and 4.0 kg or under). Parallel analyses were conducted on the two outcome measures, reporting p-values, odds ratios and associated 95% confidence intervals (CI). The intention-to-treat approach was used for both analyses. The amount of missing data was negligible and there was no evidence that missing data was not missing completely at random. Hence complete case analysis was utilised.

Ethical Approval

Approval for the study was given by the University of Huddersfield School Research Ethics Panel. Permission to conduct the study was given by the NHS Trust's Research and Development Department and the Trust's clinical governance lead and the Head of Midwifery. The Trust's Caldicott Guardian was made aware of the study protocol and that the necessary approval had been given.

Results

765 women (60.1%) who birthed at the midwife-led units intended to have active management. 508 (39.9%) intended to have expectant management. A small number of women subsequently converted from expectant to active management; however, following the intention-to-treat paradigm, these women were analysed as per intended treatment. A summary of the characteristics of the women and of risk factors for PPH partitioned by intended management approach are presented in Table 1.

Table 1: Descriptive summary of sample

Variable	Frequency (Valid %)		
	Active management	Expectant management	Total
Previous retained placenta	1 (0.13%)	0 (0.0%)	1 (0.08%)
Previous PPH due to hypotonic uterus	1 (0.13%)	0 (0.0%)	1 (0.08%)
Previous caesarean section	1 (0.13%)	0 (0.0%)	1 (0.08%)
Existing uterine abnormalities	2 (0.26%)	0 (0.0%)	2 (.016%)
Body mass index (BMI)			
<35 kg/m ²	761 (99.5%)	495 (98.4%)	1256 (99.1%)
≥35 kg/m ²	4 (0.5%)	8 (1.6%)	12 (0.9%)
Maternal age (years)			
<20	21 (2.7%)	8 (1.6%)	29 (2.3%)
20-29	340 (43.9%)	221 (43.9%)	561 (43.9%)
30-34	268 (34.7%)	182 (36.2%)	450 (35.2%)
35-39	122 (15.7%)	76 (15.1%)	198 (15.5%)
≥40	24 (3.1%)	16 (3.2%)	40 (3.1%)
Parity			
0	248 (32.4%)	187 (36.9%)	435 (34.2%)
0-3	503 (65.8%)	320 (63.1%)	823 (64.7%)
4	14 (1.8%)	0 (0.0%)	14 (1.1%)
>4	0 (0.0%)	0 (0.0%)	0 (0.0%)
Maternal age (years) (mean (SD))	29.8 (5.2)	29.9(5.24)	29.8(5.23)
Duration of 1 st stage of labour(minutes) (mean (SD))	153.0 (142)	142 (140)	148 (141)
Duration of 2 nd stage of labour(minutes) (mean (SD))	25.1 (32.5)	19.7(19.7)	23.0 (29.30)
Duration of 3rd stage of labour(minutes) (mean (SD))	21.4 (34.6)	35.1 (35.0)	26.8(35.3)
Birth weight of baby (grams)	3478 (440)	3501 (392)	3487 (423)
Birth weight of baby ≥ 4 kg	162 (20.9%)	137 (27.0%)	299 (23.3%)

Birth weight of baby < 4 kg	603 (79.1%)	370 (73.0%)	973 (77.3%)
Birth trauma			
No birth trauma	320 (41.5%)	216 (42.7%)	536 (41.9%)
1 st degree tear	175 (22.7%)	116 (22.9%)	291 (22.8%)
2 nd degree tear	251 (32.5%)	167 (33.0%)	418 (32.7%)
3 rd degree tear	23 (3.0%)	9 (1.8%)	32 (2.5%)
Outcome			
No PPH	692 (90.4%)	437 (86.0%)	1129 (89.7%)
PPH ¹	59 (9.54%)	71 (14.0%)	130 (11.3%)
Severe PPH ²	14 (1.83%)	16 (3.66%)	30 (2.38%)

¹Including cases of severe PPH

²Sub-set of PPH cases

A multiple logistic regression analysis revealed that management approach was significantly associated with the outcome of PPH with an effect of moderate magnitude ($p=0.015$; OR 1.54; 95% CI 1.09 to 2.19). None of the controlling variables were significantly associated with PPH. Table 2 summarises the regression parameters for this analysis.

Table 2: multiple logistic regression parameters (outcome=PPH)

Variable	p-value	OR	95% CI for OR	
			Lower	Upper
Management approach				
Active (reference)				
Expectant	0.015	1.54	1.09	2.19
Maternal body weight				
BMI \leq 35 kg/m ² (reference)				
BMI > 35 kg/m ²	0.746	0.785	0.181	3.41

Maternal age				
Age < 40 years (reference)				
Age ≥ 40 years	0.462	0.639	0.194	2.11
Birthweight				
Birthweight ≤ 4 kg (reference)				
Birthweight > 4 kg	0.907	0.968	0.557	1.68

A multiple logistic regression analysis revealed that management approach was not significantly associated with severe PPH (p=0.134; OR 1.744; 95% CI 0.843 to 3.609). None of the controlling variables were significantly associated with severe PPH. Table 3 summarises the regression parameters for this analysis.

Table 3: multiple logistic regression parameters (outcome = severe PPH)

Variable	p-value	OR	95% CI for OR	
			Lower	Upper
Management approach				
Active (reference)				
Expectant	0.134	1.74	0.843	3.61
Maternal body weight				
BMI ≤ 35 kg/m ² (reference)				
BMI > 35 kg/m ²	0.441	2.24	0.288	17.4
Maternal age				
Age < 40 years (reference)				
Age ≥ 40 years	0.244	2.41	0.549	10.5
Birthweight				
Birthweight ≤ 4 kg (reference)				
Birthweight > 4 kg	0.400	0.537	0.126	2.29

Discussion

The study revealed that the incidence of PPH was higher in the expectant management group compared with the active management group. This difference was statistically significant at the 5% significance level, and of moderate magnitude, with a raised odds of 54.3% in the expectant management group compared the active management group. This significant association agrees with the findings from Cochrane Systematic Reviews (Begley et al., 2010; 2011; 2015; 2019).

Although the incidence of severe PPH was higher in the expectant management group compared with the active management group, this effect was not significant at the 5% significance level. This finding is in line with the findings from the Cochrane Systematic Reviews (Begley et al., 2010; 2011; 2015; 2019). The findings from this current study, regarding severe PPH are in contrasts with those of other researchers investigating women at low risk of PPH giving birth in midwife-led and obstetric-led units, who came to the reverse conclusion (Fahy et al., 2010; Davis et al., 2012; Laws et al., 2017). The finds from this study are also in contrast to the findings from a study by Monk et al. (2014), which revealed a trend towards a higher incidence of severe PPH in the obstetric-led units, which had an increased use of active management compared to an increased use of expectant management in the midwife-led units; and by Kataoka et al. (2018), who found a significant higher incidence of severe PPH with expectant management compared to active management in women classified as low risk of PPH, giving birth in midwife-led and obstetric-led units.

No evidence was revealed that any of the variables included in the analysis additionally identified as potential risk factors for PPH were substantively or significantly associated with PPH or severe PPH. However, the relative clinical rarity of the outcomes, particularly the severe PPH outcome, may have limited the power of the analysis to detect significant effects.

Whilst the current study and other research studies have revealed significantly higher incidences of PPH with expectant management, as compared to active management, these findings are based on a low baseline, and in absolute terms the raised risk of PPH and severe PPH in expectant management approaches is low. Also, it has been commented that well-nourished, healthy women are able to compensate for a blood loss of up to 1000 mL (Blackburn, 2008; Cunningham & Williams, 2001; Oishi, Tamura & Yamamoto, 2017). As a result, a blood loss up to 1000 mL may be considered physiological in a woman depending on the woman's physiological response to that loss (World Health Organisation [WHO], 1996). Therefore, the prevalence of PPH up to 1000 mL in women at low risk of PPH with no clinical symptoms of excessive blood loss may be of limited clinical importance.

The finding of the study that a significant minority (38.4%) of women chose to have expectant third stage of labour management rather than active management, suggests that this approach seemed acceptable for them.

Numerous other studies have also shown that when women are offered expectant management as a reasonable option, they will choose it (Begley et al., 2011b; Davis et al., 2012; de Jonge et al, 2015; Dixon et al., 2009; 2013;

Fahy et al., 2010; Gottvall et al., 2011; Grigg et al., 2017; Kataoka et al., 2018; Laws et al., 2017; Monk et al, 2014; Rogers et al., 1998).

Conclusions

This study revealed a statistically significant increase in the incidence of PPH with expectant management compared with active management, but no evidence for a significant difference in incidence of severe PPH across groups defined by management style. Blood loss up to 1000 mL may be considered physiological in a woman. Therefore, the prevalence of PPH up to 1000 mL in women at low risk of PPH with no clinical symptoms of excessive blood loss may be of limited clinical importance. Expectant management is seen as a reasonable choice for some women.

Findings from this study could be used to provide evidence to inform practice guidelines and recommendations for midwife-led units. Having separate practice guidelines and recommendations for midwife-led units is important, as practices and outcomes during the third stage of labour are influenced by the healthcare professional, the woman they provide care for and the setting in which they provide care. International and national third stage of labour practice guidelines and recommendations (NICE, 2017; RCM, 2018; RCOG, 2016; WHO, 2012; 2018), which are based on research studies of varying quality and conducted in obstetric-led-units, may have limited applicability to midwives practising in midwife-led units.

Expectant management is supported by the findings of this study, as well as other research studies, as being a reasonable option for women at low risk of

PPH, who want to birth with minimal intervention at a midwife-led unit.

Therefore, midwives practising in this setting should be given the opportunity to gain the knowledge and skills to conduct both active and expectant third stage of labour management approaches. Trusts, along with Higher Education institutions, should provide education and study days to facilitate this.

Additionally, student midwives should be equally exposed to both third stage management approaches during their training, either in the clinical setting or simulated, so they are confident and skilful in both third stage approaches on qualification.

Keywords

3rd stage of labour; Expectant management; Active management; Cohort study; Post-partum haemorrhage

Key points

This large cohort study revealed: a significant minority of women at low risk of PPH birthing in midwife-led units choose to receive expectant, rather than active management of the 3rd stage of labour; the risk of PPH (blood loss 500-1000mL) and severe PPH (blood loss >1000mL) is low both in women receiving active management and in women receiving and expectant management; the incidence of PPH is significantly lower in women intending to receive active management than in women intending to receive expectant management; the incidence of severe PPH is not significantly lower in women intending to receive active management than in women intending to receive expectant management.

Reflective questions

What is the risk of PPH in women birthing in midwife-led units?

Do women prefer to opt for active or expectant management?

Does choice of management style affect incidence of PPH?

Does choice of management style affect incidence of severe PPH?

How clinically significant are this study's findings?

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