

Hysterectomy as an outcome measure for women experiencing postpartum haemorrhage in Wales: the OBSCymru perspective

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Abstract

Aims Postpartum haemorrhage (PPH) is defined as blood loss greater than 500 ml within 24 hours of childbirth, representing one of the top five causes of maternal mortality in the UK. The Obstetric Bleeding Strategy for Wales (OBSCymru) project was introduced in Wales with the primary aim of reducing harm from PPH. The aim of this study was to review hysterectomy as a clinical outcome measure for women following PPH in Wales during the second and third years of the OBSCymru initiative. The uptake of the OBSCymru protocol in clinical practice was also reviewed.

Methods A comparison of process and outcome measures between two annual cohorts of women receiving hysterectomy following PPH was performed using data from the online national OBSCymru database.

Results Ten and 12 hysterectomies were performed for PPH in 2017 and 2018, respectively. Invasive placentation represented the most common cause of PPH, accounting for 41.2% of cases in 2017 and 46.6% in 2018. Improved adherence to all four principles of the OBSCymru protocol was observed; however, there was no significant decrease in measured blood loss ($p=0.47$; median 4600 ml vs 4300 ml) or overall number of hysterectomies performed ($p=0.72$).

Conclusions Improvement in all process measures assessed indicates an overall improvement in adherence to the OBSCymru protocol. However, significant improvements were not noted within clinical outcome measures. Early hysterectomy within the context of invasive placentation is recommended in recent guidance and may represent gold-standard clinical care within this group, therefore limiting the utility of hysterectomy as a clinical outcome measure within a national quality improvement programme.

Introduction

Postpartum haemorrhage (PPH) is the fourth leading cause of maternal death in the UK¹ and the most common cause of obstetric-related admissions to intensive care.² Early identification and management of bleeding is essential to reduce the need for interventions including hysterectomy. While sometimes necessary to preserve maternal life, this invasive procedure poses many consequences to a new mother including permanent loss of fertility, effects on mother-child bonding and psychological sequelae, such as post-traumatic stress disorder.³ With this in mind, both the World Health Organisation (WHO)⁴ and the Royal College of Gynaecologists and Obstetricians (RCOG)⁵ recognise hysterectomy as an appropriate intervention in circumstances where medical and surgical interventions are unable to control bleeding. Therefore, hysterectomy has been identified as a core clinical outcome marker from an international perspective.⁶ This

highlights the relevance of hysterectomy as a marker for harm in PPH and indicates how it is appropriate to review its utility as an outcome marker.

The Obstetric Bleeding Strategy for Wales (OBSCymru) initiative was established in 2016 as a national quality improvement programme designed to prevent progression of moderate to severe PPH within Welsh hospitals. A standardised clinical proforma was developed for clinical practice based on a four-stage approach for PPH management underpinned by: (1) measurement of maternal blood loss rather than estimation; (2) risk assessment stratified by blood loss; (3) early mobilisation and action of the multidisciplinary team (MDT) at the bedside; and (4) early point-of-care (POC) testing to guide clotting factor replacement.

This study aimed to determine whether an improvement in clinical outcome markers for women receiving hysterectomy following PPH in Wales can be seen during the introduction of OBSCymru, alongside assessing adherence to the standardised OBSCymru protocol. This allowed the utility of hysterectomy as a clinical outcome marker to be assessed when reviewing the management of PPH in Wales.

Methods

The OBSCymru project was launched in 2016 across 12 obstetric units in Wales. Standardised paper management protocols were introduced from January to April 2017 and an all-Wales electronic database was created for women experiencing major PPH with blood loss greater than 1000 ml.

Table 1. Process measures and outcome measures compared between 2017 and 2018 for women receiving hysterectomy following PPH in Wales.

	Process measures	Outcome measures
1	No. of patients with blood loss measured	Median additional blood product use
2	No. of patients with completed risk assessments and completed standardised four-stage protocols	Escalation to level 2 or level 3 care
3	Median hours between delivery and first blood test performed	Use of interventional radiology
4	No. of laboratory blood tests performed and POC tests performed	Use of surgical interventions

Process measures were assigned to the principle of the standardised four-stage OBSCymru protocol they best represented, denoted using numbers 1-4. Outcome measures did not correspond to an OBSCymru principle and instead represented a clinical procedure or process.

A retrospective analysis of data entered into the electronic all-Wales OBSCymru database between January 2017 and December 2018 was

performed. Data were analysed using Microsoft Excel to compare process and outcome measures between 2017 and 2018 (Table 1). The lead research and development office (Cardiff & Vale University Health Board) deemed this project to be of quality improvement and not research, meaning that ethical approval and individual consent to collect and report data were not required.

Results

There were 31,532 deliveries recorded in Wales in 2017, and 30,214 in 2018. A total of 2791 and 3057 women experienced PPH in 2017 and 2018, respectively. Of these, 10 went on to receive hysterectomy in 2017 and 12 in 2018 ($p=0.72$). The hysterectomy rate was therefore 0.3 hysterectomies per 1000 pregnancies. Causes of PPH included uterine atony, surgical causes, placenta previa (a low-lying placenta) and placenta accreta (invasive growth of the placenta into the uterine wall) (Figure 1). Invasive placentation was the most common cause of PPH for both years, representing 50% of cases in 2017 and 58.3% of cases in 2018.

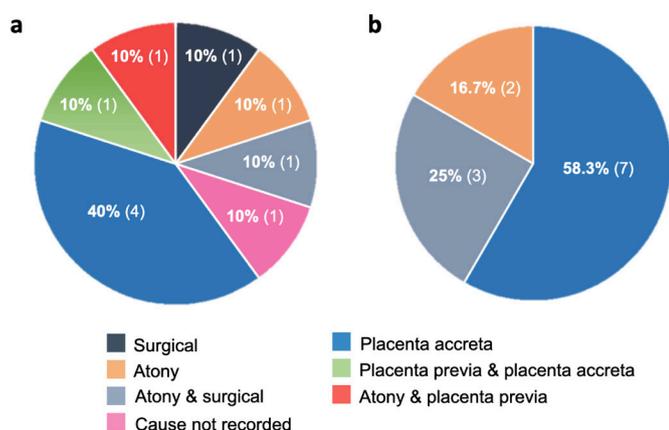


Figure 1. Underlying cause of PPH. (a) Underlying cause of PPH for women receiving hysterectomy following PPH in Wales in 2017. **(b)** Underlying cause of PPH for women receiving hysterectomy following PPH in Wales in 2018. Data are presented as % (n). Placenta accreta can also be referred to as invasive placentation.

Process measures showed numerical improvement between 2017 and 2018 for all parameters assessed within the OBSCymru protocol (Table 2).

Table 2. Process measures for women receiving hysterectomy following PPH in Wales between 2017 and 2018.

OBSCymru principle	Process measure	2017	2018
1. Measurement of blood loss	Blood loss measured	90.0% (9)	100.0% (12)
2. Risk assessment stratified to blood loss	Risk assessment completed	40.0% (4)	75.0% (9)
	Four-stage paperwork used	20.0% (2)	66.7% (8)
3. Early MDT mobilisation and action	Median hours between delivery and first blood test	01:08 [01:05–04:59]	00:48 [00:32–02:23]
4. Use of POC testing to guide fibrinogen replacement	Number of laboratory blood tests	5.0 [4.0–11.8]	5.0 [2.8–9.0]
	Number of POC tests	1.0 [0.0–2.0]	3.0 [1.0–4.3]

Results are reported as median [IQR] or % (n). Time is reported as [hours:minutes]. Parameters are assigned to the principle of the standardised paper OBSCymru protocol they best represent.

A median [interquartile range (IQR)] of 4600 ml [1880.5–5875] and 4300 ml [3503.8–5542.5] measured blood loss was recorded from 2017 to 2018, respectively ($p=0.47$). Outcome measures revealed

a modest numerical decrease in median red blood cell and fresh frozen plasma (FFP; a blood component containing clotting factors) use, number of patients receiving level 2 care outside the delivery suite, advice obtained for interventional radiotherapy and number of Bakri balloon interventions performed. All other parameters were observed to increase or remain constant from 2017 to 2018 (Table 3).

Table 3. Clinical outcome measures for women receiving hysterectomy in Wales following PPH during 2017 and 2018.

Outcome measure	2017	2018	
Median blood products	Red blood cells (units)	6.0 [3.0, 8.0]	5.5 [3.0, 7.3]
	Fibrinogen (g)	0.0 [0.0, 0.0]	0.0 [0.0, 4.0]
	Platelets (units)	0.0 [0.0, 0.8]	0.0 [0.0, 0.0]
	Cryoprecipitate (units)	0.0 [0.0, 1.5]	0.0 [0.0, 0.0]
	FFP (units)	3.0 [0.0, 4.0]	0.0 [0.0, 3.3]
	Recombinant factor VIIa (µg)	0.0 [0.0, 0.0]	0.0 [0.0, 0.0]
Escalation of care	Patient received level 2 care on the delivery suite	90.0% (9)	91.7% (11)
	Patient received level 2 care outside the delivery suite	20.0% (2)	0.0% (0)
	Patient received level 3 care outside the delivery suite	40.0% (4)	41.7% (5)
Interventional radiology	Advice obtained	10.0% (1)	0.0% (0)
	Pre-planned procedure	0.0% (0)	25.0% (3)
	Emergency procedure	0.0% (0)	8.3% (1)
Surgical interventions	Homeostatic uterine suture	20.0% (2)	33.3% (4)
	Bakri balloon	20.0% (2)	8.3% (1)
	Internal iliac artery ligation	0.0% (0)	8.3% (1)

Results represented as median [IQR] or % (n). Level 2 care can be provided on the delivery suite or on a high-dependency unit while level 3 care can only be delivered within an intensive care unit away from the delivery suite. Care separate from the delivery suite requires maternal–baby separation.

Discussion

Modest improvements were noted across all process measures between 2017 and 2018. This may reflect an improved adherence to the OBSCymru protocol within the clinical setting; however, a small sample size and limited study time makes this difficult to confirm. Further audit would be required to confirm improved adherence, but it is likely that annual teaching introduced as part of the PRactical Obstetric Multi-Professional Training programme (PROMPT)⁷ during 2018 may have contributed towards these observed improvements. This is a promising outcome and it is possible that a positive uptake of the OBSCymru protocol could improve maternal outcomes over time.

No consistent improvement in clinical outcome markers was identified within the cohort, with no significant improvement in measured blood loss ($p=0.47$) or overall number of hysterectomies performed ($p=0.72$). This was likely to have been influenced by small sample size accountable to the rare incidence of hysterectomy within the setting of obstetrics. Furthermore, this low hysterectomy rate is comparable with those described in the USA⁸ and Scotland⁹ indicating that the small hysterectomy cohorts within this study in Wales can be expected.

Limited improvement in clinical outcomes may also be influenced by a high proportion of underlying invasive placentation in this population. Recent Green-top Guidance from the RCOG advises

early hysterectomy during PPH within the setting of invasive placentation,^{5,10} indicating that hysterectomy may represent gold-standard care for these women and would have been unavoidable despite OBSCymru measures.

Future directions Hysterectomy is a complex, multi-factorial event and it may therefore be more appropriate to regard these events as individual case studies with independent learning points. This study focussed on data gathered following OBSCymru initiation, and it may be revealing to compare clinical outcomes with those before OBSCymru was implemented. However, this lies outside of the scope of this investigation and would be a topic of future research. Furthermore, exploration of different clinical outcome measures, such as admission to intensive care, may yield larger sample sizes and offer a more robust clinical outcome measure when assessing the effects of OBSCymru measures on PPH management in Wales.

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References

1. Knight M, Nair M, Tuffnell D, et al (2017) Saving lives, improving mothers' care: lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2013–15. Available from: www.npeu.ox.ac.uk/downloads/files/mbrace-uk/reports/MBRRACE-UK%20Maternal%20Report%202017%20-%20Web.pdf. Accessed: 9 December 2019.
2. Zwart JJ, Dupuis JR, Richters A, et al. Obstetric intensive care unit admission: a 2-year nationwide population-based cohort study. *Intensive Care Med*, 2010; 36(2):256-263.
3. de la Cruz CZ, Coulter ML, O'Rourke K, et al. Women's experiences, emotional responses and perceptions of care after emergency peripartum hysterectomy: a qualitative survey of women from 6 months to 3 years postpartum. *Birth*, 2013; 40(4):256-263.
4. World Health Organisation (2012) WHO recommendations for the prevention and treatment of postpartum haemorrhage. Available from: https://apps.who.int/iris/bitstream/handle/10665/75411/9789241548502_eng.pdf?sequence=1. Accessed: 9 December 2019.
5. Mavrides E, Allard S, Chandraran E, et al. Prevention and management of postpartum haemorrhage. *BJOG*, 2016; 124(5):e106–e149.
6. Meher S, Curhbert A, Kirkham JJ, et al. Core outcome sets for prevention and treatment of postpartum haemorrhage: an international Delphi consensus study. *BJOG*, 2019; 126(1):83-93.
7. Abdelraham A, Murnaghan M. Practical Obstetric Multi-Professional Training course. *BMJ*. 2013; 346:e8561.
8. Shields LE, Wiesner S, Fulton J, et al. Comprehensive maternal haemorrhage protocols reduce the use of blood products and improve patient safety. *J Obstet Gynecol*, 2015; 212(3):272-280.
9. Lennox C, Marr L. Scottish confidential audit of severe maternal morbidity: reducing avoidable harm (2014) Available from: www.healthcareimprovementscotland.org/programmes/reproductive,_maternal__child/programme_resources/scasmm.aspx. Accessed: 9 December 2019.
10. Jauniaux ERM, Alfirevic Z, Bhide AG. Placenta praevia and placenta accreta: diagnosis and management. Green-top Guideline No. 27a. *BJOG*, 2018; 126(1):e1–e48.