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National Maternity Data Development Project

Research brief **no. 8**

Primary postpartum haemorrhage

Postpartum haemorrhage, a form of obstetric haemorrhage, is excessive bleeding from the genital tract after childbirth. Postpartum haemorrhage is usually defined as a blood loss of 500 mL or more; however, as blood loss volume is extremely difficult to quantify accurately and frequently underestimated, haemodynamic instability is an important part of the diagnosis and a smaller blood loss may be significant in a severely compromised woman. A loss of 1,000 mL or more is considered major or severe, although definitions of severity vary (Medforth et al. 2011; Queensland Maternity and Neonatal Clinical Guidelines Program 2012; RANZCOG 2014; RCOG 2009).

Postpartum haemorrhage is further classified into **primary** (occurring within 24 hours of birth), and **secondary** (occurring between 24 hours and 6 weeks postpartum) (RANZCOG 2014; RCOG 2009; Queensland Maternity and Neonatal Clinical Guidelines Program 2012).

Primary postpartum haemorrhage makes up the majority of cases of postpartum haemorrhage (WHO 2012), and is the subject of this paper. However, statistics reported in this brief may include secondary postpartum haemorrhage, as it is not always clear in the literature whether a study refers to all postpartum haemorrhages or to primary postpartum haemorrhage, and, on occasion, the available data do not allow this distinction.

Significance of postpartum haemorrhage to maternal morbidity and mortality

Postpartum haemorrhage accounts for nearly one-quarter of all maternal deaths globally, and is the leading cause of maternal mortality in developing countries (Knight et al. 2009; WHO 2012). It also contributes significantly to severe maternal morbidity. A Canadian study showed that postpartum haemorrhage caused over 50% of severe maternal morbidity (Joseph et al. 2007). Haemorrhage is the major cause of severe maternal morbidity in almost all 'near miss' audits in both developed and developing countries (RCOG 2009). For every maternal death there are around 80 instances of 'near-miss' (reported in Royal Women's Hospital Melbourne 2012).

Consequences of postpartum haemorrhage include anaemia and fatigue that may affect the mother's ability to care for her newborn, and may increase the risk of postnatal depression. Blood transfusion may be necessary and is not without risk. In severe cases, haemorrhagic shock may lead to dilutional coagulopathy (where a patient's blood is diluted by transfused blood products which may contain insufficient coagulants), cardiac dysfunction, other organ impairment, anterior pituitary ischemia (Sheehan's syndrome, a rare condition which affects the pituitary gland) with delay or failure of lactation, and death (Anderson & Etches 2007; WHO 2012). Patients may undergo hysterectomy to stop the bleeding. A study conducted in Australia and New Zealand estimated that in 2010–2011 the incidence of peripartum hysterectomy to control haemorrhage was 6.0 per 10,000 women giving birth (AIHW: Johnson et al. 2014).

The onset of postpartum haemorrhage is often unpredictable and sudden, and may have catastrophic results (Welsh et al. 2008). This makes prevention difficult, and the focus is often on prevention, recognition and management of the condition, and optimisation of the women's haemoglobin antenatally.

Risk factors and causes

Most women who have a postpartum haemorrhage have no identifiable risk factors (WHO 2012). However there are factors that might help to identify some women at risk of the event, including grand multiparity and multiple gestation, which are associated with an increased risk of bleeding after birth (WHO 2012).

Uterine atony, the failure of the uterus to contract after delivery, is a common cause of postpartum haemorrhage. However, the main risk factors for emergency peripartum hysterectomy (a major intervention to prevent uncontrollable haemorrhage) appear to be changing over time from uterine atony to abnormal placentation (Machado 2011; Umezurike & Adisa 2012). A higher incidence of abnormal placentation appears to be associated with rising rates of caesarean delivery. A United Kingdom Obstetric Surveillance System (UKOSS) study found that peripartum hysterectomy was strongly associated with previous caesarean section birth, and the risk rose with an increasing number of previous caesarean births (Knight et al. 2008). Abnormal placentation may occur more readily in the presence of a uterine scar such as that from a previous caesarean delivery, which may impair placental attachment for future pregnancies (Awan et al. 2011; Sholapurkar 2013; Yang et al. 2007). (See the AIHW website for the NMDDP research brief on peripartum hysterectomy for more information.)

Other possible risk factors for, and causes of, postpartum haemorrhage include nulliparity, pre-eclampsia, previous caesarean birth, previous postpartum haemorrhage, genital tract trauma, uterine rupture, retained placenta, maternal coagulation disorders, augmented labour, arrest of descent, and instrumental birth (Anderson et al. 2000, reported in WHA 2007; WHO 2012).

Pre-existing anaemia may also exacerbate the impact of a postpartum haemorrhage, meaning that a smaller blood loss may still be critical (WHO 2012).

Prevalence/incidence, mortality and trends

The global incidence of primary postpartum haemorrhage of 1,000 mL or more has been estimated at 10.5% of live births, with a case fatality rate of 1%. A further 12% survive, but with severe anaemia (AbouZahr 2003).

Australian studies, and studies in other developed countries, suggest that the rate of postpartum haemorrhage in these countries is between 1% and 5% of live births (Anderson & Etches 2007; Lu et al. 2005; Royal Women's Hospital 2012; WHA 2007; WHO 2012). However, it is difficult to determine how comparable international statistics are due to different definitions used in the studies reporting these rates.

Postpartum haemorrhage is one of the leading causes of maternal mortality in Australia. Obstetric haemorrhage (which includes antepartum haemorrhage) was responsible for 18% of maternal deaths over the period 2006–2010 and 11% in 2008–2012 (AIHW: Humphrey et al. 2015; AIHW: Johnson et al. 2014).

In Australia, over 2008–2012 there were 12 maternal deaths due to obstetric haemorrhage, a maternal mortality ratio (MMR) of 0.8 per 100,000 (AIHW: Humphrey et al. 2015). The MMR has remained stable since 2003. Obstetric haemorrhage was the third most common cause of maternal death and the most common cause of direct maternal death.

Obstetric haemorrhage was found to be the third highest direct cause of maternal death in the United Kingdom in 2009–2012 (4.9 deaths per million maternities) (Knight et al. 2014).

It appears that rates of postpartum haemorrhage may have been increasing in developed countries over the last two decades; however the situation remains unclear. Kramer and others (2013), in a study of 8.5 million deliveries in the United States of America, found a doubling in incidence of severe postpartum haemorrhage between 1999 and 2008, from 1.9 to 4.2 per 1,000 deliveries. Risk factors were found to be advanced maternal age, multiple pregnancy, fibroids, pre-eclampsia, amnionitis, placenta praevia, abruption, cervical laceration, uterine rupture, and operative delivery. However, changes in these risk factors accounted for only 6% of the increase.

The International Postpartum Hemorrhage Collaborative Group conducted a study to investigate these trends and their causes (Knight et al. 2009). Using ICD-coded data, the investigators observed an increasing trend in postpartum haemorrhage between 1991 and 2006 in Canada, New South Wales and the United States of America. This increase was limited solely to immediate/atonic postpartum haemorrhage. Using other data (such as perinatal data), an increase was also observed in postpartum haemorrhage in Victoria between 1991 and 2006, and in severe obstetric haemorrhage in Scotland between 2003 and 2007. No increases were observed in maternal mortality associated with postpartum haemorrhage in any country (Knight et al. 2009).

The investigators were unable to explain the increase after adjusting for many factors and concluded: 'Further research is required to…investigate potential risk factors, including increased duration of labour, obesity and changes in second and third stage management practice' (Knight et al. 2009).

A Canadian study into the increase in postpartum haemorrhage with hysterectomy showed substantial increases in postpartum haemorrhage, and postpartum haemorrhage with hysterectomy, in Canada between 1991 and 2004. The investigators found that the rising rates were due to increases in the frequency and, possibly, the severity of atonic postpartum haemorrhage. Advanced maternal age and previous caesarean section did not explain the increase, and while the data did not permit the study of obesity as a factor, the investigators believe this to be a factor warranting further research (Joseph et al. 2007).

Similarly, an Australian study found increases in postpartum haemorrhage between 1994 and 2002 that were not explained by the changing risk profile of women. The investigators surmised that changes in management and/or reporting of postpartum haemorrhage may have resulted in higher postpartum haemorrhage rates (Ford et al. 2007).

Data collection and analysis issues

Further research is needed to understand whether the increases in rates of postpartum haemorrhage in Australia and other developed countries are continuing, and the reasons for this.

Analysis is hindered by inaccurate diagnosis and recording of postpartum haemorrhage. Accurate estimation of blood loss is important, as it warns of impending haemorrhagic shock and therefore triggers the appropriate intervention. Visual estimation of blood loss is known to be highly inaccurate (Knight et al. 2009). For example, Bose and others (2006)

demonstrated considerable discrepancy between actual and estimated blood loss in a number of obstetric scenarios. These investigators also devised an algorithm for estimating blood loss for use in training of clinicians which has been shown to be effective (Maslovitz et al. 2008).

The definition of postpartum haemorrhage is inconsistent across Australian jurisdictions and internationally. Definitions of what constitutes a postpartum haemorrhage vary, with some countries and states using 500 or 600 mL as the minimum level for defining PPH, while others use 1,000 mL. Different definitions may be used depending on whether the delivery is vaginal or caesarean, with a higher blood loss considered normal for caesarean deliveries. Definitions of severity also differ, from 1,000 mL as a measure of severity up to 2 litres or more.

Where hospital morbidity data are used to study postpartum haemorrhage, the translation of definitions to International Classification of Disease (ICD) coding complicates the interpretation of data (Knight et al. 2009). ICD-10 codes are themselves limited, so what coders can record is limited. For example, separate codes for atonic PPH, and PPH due to other causes, are not available.

Definitions used in perinatal data collections differ to the ICD-10-AM codes and are inconsistent across jurisdictions.

Data development undertaken through the National Maternity Data Development Proejct

Following stakeholder consultations in 2011–12 conducted as part of the National Maternity Data Development Project (NMDDP), data on postpartum haemorrhage were nominated as high priority for national standardised collection (AIHW 2014). A data item on postpartum haemorrhage also received support from all jurisdictions to be taken forward for national standardisation, and the item *Severe primary postpartum haemorrhage* was subsequently included on the NMDDP priority data item list for data development. See *Foundations for enhanced maternity data collection and reporting in Australia: National maternity data development project—Stage 1* (AIHW 2014) for more information on the NMDDP priority data item list.

Data development began in 2013 and included consultation with a Clinical And Data Reference Group, the NMDDP Advisory Group and jurisdictional stakeholders. Concurrent work on the National Core Maternity Indicators (NCMI) project was taken into account. The NCMI is a set of 20 maternity indicators set up to monitor the quality of maternity care in Australia (see AIHW 2013). Indicator 14 will report Blood loss of (i) ≥1,000 mL and <1,500 mL and (ii) ≥1,500 mL during first 24 hours after the birth of the baby for (a) vaginal births and (b) caesarean sections.

Three national health data standards were developed:

Female—estimated blood loss indicating primary postpartum haemorrhage, estimated blood loss volume category, code N (METeOR identifier 522192)

Female—primary postpartum haemorrhage indicator, yes/no/not stated/inadequately described code N(METeOR identifier 504959)

Female—blood transfusion due to primary postpartum haemorrhage indicator, yes/no/not stated/inadequately described code N (METeOR identifier 522211).

(More information about METeOR, the AIHW's metadata registry, is available on the AIHW website at <http://meteor.aihw.gov.au/content/index.phtml/itemId/1811627>.)

The data standards are designed to capture all primary postpartum haemorrhages. All volume measures have the limitation of accurate measurement of blood loss. In addition, the item cannot account for the different policies and practices of hospitals in relation to transfusion. However, the combination of measures (volume and transfusion) will assist to provide a clearer picture of the severity of the haemorrhage for most women.

The agreed approach aligns with the NCMI and will allow this indicator to be reported on.

The national data standards are included in the National Health Data Dictionary (AIHW 2012) and were included for the first time in the Perinatal Data Set Specification (DSS) 2014–15, for jurisdictions to collect from 1 July 2014 where feasible. While currently optional for collection, it is expected that the data elements will be included in a future Perinatal National Minimum Data Set (NMDS), making them mandatory items for collection once all jurisdictions are able to implement the necessary processes in their collections.

Importance of national collection of these data items

Postpartum haemorrhage is a leading cause of maternal mortality in Australia and contributes significantly to severe maternal morbidity. Studies suggest that the incidence of postpartum haemorrhage in developed countries is between 1% and 5% of live births; however it appears that the rate may have been increasing over the last two decades. The situation remains unclear and further research is needed.

New national data standards are designed to capture primary postpartum haemorrhage, and a combination of volume and transfusion measures will help provide a clearer picture of the severity of haemorrhage for most women. National data collected in a consistent manner will assist with monitoring of incidence and trends into the future.

References

AbouZahr C, for World Health Organization, 2003. Global burden of maternal death and disability. British Medical Bulletin 67:1–11.

AIHW (Australian Institute of Health and Welfare) National Perinatal Epidemiology and Statistics Unit & AIHW 2013. National core maternity indicators. Cat. no. PER 58. Canberra: AIHW.

AIHW 2012. National health data dictionary 2012 version 16. Cat. no. HWI 119. Canberra: AIHW. Viewed 12 February 2015, <http://www.aihw.gov.au/publication-detail/?id=10737422826>.

AIHW 2014. Foundations for enhanced maternity data collection and reporting in Australia: national maternity data development project stage 1. Cat. no. PER 60. Canberra: AIHW.

AIHW: Humphrey MD, Bonello MR, Chughtai A, Macaldowie A, Harris K & Chambers GM 2015. Maternal deaths in Australia 2008–2012. Maternal deaths series no. 5. Cat. no. PER 61. Canberra: AIHW.

AIHW: Johnson S, Bonello MR, Li Z, Hilder L & Sullivan EA 2014. Maternal deaths Australia 2006–2010. Maternal deaths series no. 4. Cat. no. PER 61. Canberra: AIHW.

Anderson J & Etches D 2007. Prevention and management of postpartum hemorrhage. American Family Physician. Viewed 8 May 2013, <http://www.aafp.org/afp/2007/0315/p875.html>.

Awan N, Bennett M & Walters W 2011. Emergency peripartum hysterectomy: a 10-year review at the Royal Hospital for Women, Sydney. Australian and New Zealand Journal of Obstetrics and Gynaecology: 210-5.

Bose P, Regan F & Paterson-Brown S 2006. Improving the accuracy of estimated blood loss at obstetric haemorrhage using clinical reconstructions. BJOG An International Journal of Obstetrics and Gynaecology 113(8):919–24.

Ford J, Roberts C, Simpson J, Vaughanm J & Cameron C 2007. Increased postpartum hemorrhage rates in Australia. International Journal of Gynecology & Obstetrics 98(3):237–43.

Joseph K, Rouleau J, Kramer M, Young D, Liston R & Baskett T 2007. Investigation of an increase in postpartum haemorrhage in Canada (for the Maternal Health Study Group of the Canadian Perinatal Surveillance System). BJOG An International Journal of Obstetrics and Gynaecology 114(6):751–9.

Knight M, Kurinczuk JJ, Spark P & Brocklehurst P for the United Kingdom Obstetric Surveillance System Steering Committee 2008. Cesarean delivery and peripartum hysterectomy. Obstetrics & Gynecology 111:97–105.

Knight M, Callaghan W, Berg C, Alexander S, Bouvier-Colle M, Ford J et al. 2009. Trends in postpartum hemorrhage in high resource countries: a review and recommendations from the International Postpartum Hemorrhage Collaborative Group. BMC Pregnancy and Childbirth 9(55).

Knight M, Kenyon S, Brocklehurst P, Neilson J, Shakespeare J & Kurinczuk JJ (eds.) on behalf of MBRRACE-UK 2014. Saving lives, improving mothers' care—lessons learned to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–12. Oxford: Oxford University Press.

Kramer MS, Berg C, Abenhaim H, Dahhou M, Rouleau J, Mehrabadi A et al. 2013. Incidence, risk factors, and temporal trends in severe postpartum hemorrhage. American Journal of Obstetrics & Gynecology 209(5):449.e1–7.

Li Z, Zeki R, Hilder L & Sullivan EA 2012. Australia's mothers and babies 2010. Perinatal statistics series no. 27. Cat. no. PER 57. Canberra: AIHW National Perinatal Epidemiology and Statistics Unit.

Lu M, Fridman M, Korst L, Gregory K, Reyes C, Hobel C et al. 2005. Variations in the incidence of postpartum hemorrhage across hospitals in California. Maternal & Child Health Journal 9(3):297–306.

Machado L 2011. Emergency peripartum hysterectomy: Incidence, indications, risk factors and outcome North American Journal of Medical Sciences. 2011 August; 3(8): 358–361.

Maslovitz S, Barkai G, Lessing J, Ziv A & Many A 2008. Improved accuracy of postpartum blood loss estimation as assessed by simulation. Acta Obstetricia et Gynecologica Scandinavica 87(9):929–34.

Medforth J, Battersby S & Evans M 2011. Oxford handbook of midwifery. Oxford: Oxford University Press.

Queensland Maternity and Neonatal Clinical Guidelines Program 2012. Queensland maternity and neonatal clinical guideline: primary postpartum haemorrhage. Guideline no. MN12.1-Va-R17. Brisbane: Queensland Health.

RANZCOG (Royal Australian and New Zealand College of Obstetricians and Gynaecologists) 2014. Management of postpartum haemorrhage (PPH): college statement C-Obs 43. Sydney: RANZCOG.

RCOG (Royal College of Obstetricians and Gynaecologists) 2009. Prevention and management of postpartum haemorrhage: Green-top guideline no. 52. London: RCOG.

Royal Women's Hospital 2012. Labour: management of post-partum haemorrhage including postnatal care policy, guideline and procedure manual. Melbourne: Royal Women's Hospital.

Sholapurka S 2013. Increased incidence of placenta praevia and accreta with previous caesareans—a hypothesis for causation. Journal of Obstetrics & Gynaecology 33(8):806–9.

Umezurike CC & Adisa CA 2012. Peripartum hysterectomy. In: Al-Hendy A (ed.). Hysterectomy. Viewed 3 February 2016, <http://www.intechopen.com/books/hysterectomy/peripartum-hysterectomy: InTech>.

Welsh A, Gatt S, Somerset D, Popham P & Ogle R 2008. Guidelines for the use of recombinant activated factor VII in massive obstetric haemorrhage. Australian and New Zealand Journal of Obstetrics and Gynaecology 48:12–16.

WHA (Women's Healthcare Australasia—formerly Women's Hospitals Australasia) 2007. Supporting excellence in maternity care: the core maternity indicators project: findings from the core maternity indicators project. Canberra: WHA.

WHO (World Health Organization) 2012. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: WHO.

Yang Q, Wen S, Oppenheimer L, Chen X, Black D, Gao J et al. 2007. Association of caesarean delivery for first birth with placenta praevia and placental abruption in second pregnancy. BJOG An International Journal of Obstetrics and Gynaecology 114(5):609–613.

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