Preventing Postpartum Hemorrhage

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skin-to-skin contact breastfeeding oxytocin postpartum hemorrhage

1. Introduction

Globally, 295,000 maternal deaths occurred in 2017, resulting in an overall MMR of 211 deaths per 100,000 births. Obstetric hemorrhage is the leading cause of maternal death worldwide, accounting for 27.1% of all maternal deaths [1]. The active management of the third stage of labor (AMTSL) is a preventive measure for PPH and consists of the administration of exogenous oxytocin (Pitocin), control cord traction, and early cord clamping. However, there is growing evidence of the adverse effects of exogenous oxytocin in normal maternal physiological changes during postpartum and an increased risk of PPH in women who have received higher doses of exogenous oxytocin [2][3][4].

The physiological management of the third stage of labor has received increased attention from researchers. Many studies have been conducted to investigate the effects of early skin-to-skin contact (SSC) between the newborn and the mother and early breastfeeding on the prevention of PPH through their effects on the duration of the third stage of labor and postpartum blood loss [5][6][7][8][9][10][11]. This review aimed to determine the role of SSC and BF on PPH, the duration of the third stage of labor, and the amount of postpartum blood loss, and to clarify the physiological mediator of their effects on women during labor.

2. Postpartum Hemorrhage

The definition of postpartum hemorrhage varies across institutions. The WHO defines PPH as “blood loss of 500 mL or more within 24 h after birth, while severe PPH is blood loss of 1000 mL or more within 24 h” [12].The Royal College of Obstetricians and Gynecologists [13] defines PPH as “the loss of 500 mL or more of blood from the genital tract within 24 h of the birth of a baby. The American College of Obstetricians and Gynecologists (ACOG) defined PPH as blood loss of more than 500 mL for vaginal delivery and more than 1000 mL for cesarean section [14], while their updated definition is “a cumulative blood loss of greater than or equal to 1000 mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 h after the birth process” [15].

Saxton et al. classified the definition of PPH into medical and physiological definitions. Their medical definition of PPH is “blood loss greater than 499 mL,” while the physiological definition is “blood loss of any volume that causes signs of shock or anemia; this volume might vary from woman to woman” (p. 2) The main cause of PPH is uterine atony, i.e., the failure of the uterus to contract efficiently after placenta delivery, which is known as atonic PPH [16][17][18]. PPH commonly lasts for 24 h, which is called immediate PPH, but there are instances of hemorrhage for up to six weeks after delivery, which is known as delayed PPH [19].

Obstetric hemorrhage is one of the leading contributing factors to maternal deaths worldwide, representing 27.1% of pregnancy-related deaths [1]. This preventable condition has caused challenges to obstetric care globally. carried out a systematic review and meta-analysis of 71 studies using meta-regression techniques to provide regional estimates of the prevalence of postpartum hemorrhage and found that the overall prevalence rate was 10.8% worldwide for blood loss ≥ 500 cc, with Africa accounting for 25.7% of cases, both Latin America and Asia accounting for 8% each, and 13% in both Europe and North America [20]. The incidence of PPH in the United States has increased by 27% from 1995–2004 [21].

Besides contributing to mortality rates, PPH is a source of concern because it is associated with severe maternal morbidity. estimated the frequency of severe maternal morbidity and assessed the underlying etiologies in the United States, and found that PPH is responsible for almost half of all cases of severe morbidity (46.6%) [22]. Maternal hemorrhage is linked to adverse effects, such as anemia, hypovolemic shock, disseminated intravascular coagulation, acute respiratory distress, renal failure, impaired breastfeeding, and the worsening of existing diseases in mothers, which compromises both physical and psychological health [23][24].

The most common cause of PPH is uterine atony [25][26]. The causes of PPH can be summarized by the four Ts, as shown in Table 1: trauma (injuries resulting from lacerations), tone (uterine atony), thrombin (bleeding disorders), and tissue (retained tissues) [26][27][28][29].

The most common factor contributing to the increasing rate of PPH is uterine atony, which is known as atonic PPH. Between 75 and 80% of PPHs result from uterine atony [26][30][31]. This condition develops when the uterine musculature loses its tone. Several factors predispose women to uterine atony, including uterine leiomyomata, multiple gestations, oxytocin augmentation, over-distention of the uterus, chorioamnionitis, prolonged labor, grand multiparity, fetal macrosomia, polyhydramnios, precipitous labor, and exposure to magnesium sulfate regiments and halogenated anesthetics [27].

Despite the knowledge of risk factors, evidence of specific predisposing factors has not yet been documented, and many of the findings are only claims. Since bleeding is a common problem after delivery, predicting cases that will lead to atonic PPH is a challenge. Moreover, atonic PPH can occur without risk factors, and statistics show that atonic PPH occurs more frequently in women without risk factors [32][33]. In this way, all women are equally vulnerable to PPH; thus, preventive measures should be part of each delivery process.

Despite the evidence that PPH occurs independently of the presence of risk factors, the knowledge of them remains the most commonly used approach to predicting the probability of hemorrhage [34]. PPH is a rapid and unpredictable maternal condition that has few leading symptoms. Documented findings have highlighted that 60% of women do not express any sign of increased likelihood of experiencing excessive bleeding [35]. In instances where there is poor service delivery, women can receive poor maternal care that exposes them to complications.

Some of the risk factors that interfere with the ability of the uterus to contract are the size of the infant (i.e., a large baby weighing more than 4.0 kg); placenta previa; polyhydramnios; exhaustion of muscles following prolonged labor; incomplete separation of the placenta; a full bladder; high parity; weakening of the myometrium, which may fail to contract; multiple gestations; the administration of an exogenous hormone (Pitocin) [2][18][21][28][36][37][38]. One of the negative effects of exogenous oxytocin in normal labor is its reduction in the production of endogenous oxytocin [39][40]. Anemia during pregnancy increases the risk of PPH. The process of clotting is affected, which makes it difficult to stop bleeding and manage PPH, and can lead to death [30].

Two methods are used to manage the third stage of labor to prevent PPH: active and expectant management. Active management involves using early cord clamping, a prophylactic uterotonic, and controlled cord traction to promote the delivery of the placenta. The use of oxytocin reduces the risk of PPH in both cesarean and vaginal births During expectant or physiologic management, the placenta is allowed to be delivered spontaneously or with maternal pushing efforts only (hands-off)

Many studies have compared the two methods in managing the third stage of labor (active versus expectant), and most have favored active management for preventing severe PPH (>1000 mL of blood loss) [3]. Prediville et al. conducted a trial that compared active and expectant management, and expectant management was associated with a three times higher possibility of PPH compared to the active management group (OR: 3.1, 95% CI: 2.3–4.2) [41]. In women from the active management group, they found significant increases in maternal diastolic blood pressure, vomiting after birth, after-birth pains, use of analgesia from birth to discharge from the labor ward, and more women returning to the hospital with bleeding. A decrease in the baby's birth weight was also related to active management, reflecting the lower blood volume from interference with placental transfusion [42].

Hence, it can be concluded that there is still uncertainty surrounding the optimal management of PPH. Some researchers suggested that physiological management might be an optimal way to help mothers release oxytocin, which results in the efficient separation of the placenta without introducing possible complications through medical interventions, especially in low-risk women. Recently, there has been a call to decrease nonessential interventions for healthy women in normal labor due to the increasing rate of PPH incidence in developed countries, such as the United States [2][16][43]. Therefore, introducing skin-to-skin contact (SSC) and immediate breastfeeding (BF) to prevent PPH are considered innovative and crucial ways for the optimal management of PPH

Seeking a preventive treatment for PPH is important because the prevalence rate has remained unchanged with current treatments. The incidence of atonic PPH is greater in low-income, third-world populations that do not have access to medication to stop hemorrhages. Atonic PPH is also a growing problem in developed countries such as

the United States, where the rate of PPH has doubled over the last 10 years [18][44][45]. Endogenous oxytocin does not have the adverse effects that exogenous oxytocin has, and the need for a readily available, low-cost treatment is great [46][47].

3. Physiological Management to Prevent or Minimize the PPH Incidence Rate

One of these approaches is to apply nipple stimulation during labor. Nipple stimulation affects the pituitary gland, which leads to the release of oxytocin, a hormone that is associated with inducing labor. This intervention is carried out within 15 min after delivery and seeks to achieve a short-term burst of oxytocin. Spiking levels of the hormone lead to an increase in uterine contractions.

The findings revealed a 17−730% increase in uterine activity with breastfeeding and nipple stimulation All subjects demonstrated increases in their uterine activity, with the major increase among women who had breastfed their babies compared to women who were manually stimulating their nipples. The median increase in uterine activity with breastfeeding was 93%, and the median increase in uterine activity with synthetic oxytocin (the preferred drug used to prevent PPH) was 96.5% [48]. Therefore, natural measures have value in the prevention of PPH and may avoid unnecessary intervention during the normal processes of labor using high-alert medications, such as Pitocin [32][49][31][33][34][35][50][37][38][39][40].

Another physiological measure that influences oxytocin levels positively is SSC, which is a multisensory approach. SSC stimulates the pituitary gland to release oxytocin). Elevated levels of the hormone in the blood, with the uterus being the target organ, lead to increased contractions, thus preventing PPH. This approach is relatively new, and scholars have not yet explored this intervention extensively [7][40][51].

4. Previous Studies on the Effects of Breastfeeding and Skin-to-Skin Contact on PPH

The greatest risk during the postpartum period is PPH, which can be prevented by boosting oxytocin hormone levels through physiological measures, such as BF and SSC.

Saxton et al. ’s study on the effects of SSC and BF at birth on the incidence of PPH was a retrospective cohort study that aimed to determine whether immediate SSC and BF affected the rate of PPH. The database included 10,000 women who were analyzed for incidences of PPH. The findings revealed statistically significant results showing that women who breastfeed or experience SSC are less likely to have PPH ($p < 0.0001$ for both SSC and BF)

Bingham found that the use of Pitocin made PPH persistent. As such, she called for the use of nonpharmacological interventions, which she argued are not only effective but also promote the mothers’ health. She found that the use of Pitocin leads to a decrease in a woman’s HCT and HGB by 24.0 and 8.5 after delivery, respectively, with a

further decrease to 22.3 and 7.9 at 48 h after delivery, respectively [45]. These findings showed that the pharmacological approach should be discouraged and replaced with SCC and BF as interventions to prevent PPH, which are consistent with Campbell-Yeo et al.

A retrospective cohort study including 154 cases of atonic PPH found that women who were diagnosed with atonic PPH and had SSC and BF bled less compared to women who were diagnosed with PPH but did not have SSC and BF during their first hour after giving birth [16].

References

1. World Health Organization. Maternal Mortality: Level and Trends 2000 to 2017. In Sexual and Reproductive Health; World Health Organization: Geneva, Switzerland, 2019; Available online: (accessed on 26 March 2021).
2. Knight, M.; Callaghan, W.M.; Berg, C.; Alexander, S.; Bouvier-Colle, M.-H.; Ford, J.B.; Joseph, K.S.; Lewis, G.; Liston, R.M.; Roberts, C.L.; et al. Trends in postpartum hemorrhage in high resource countries: A review and recommendations from the International Postpartum Hemorrhage Collaborative Group. BMC Pregnancy Childbirth 2009, 9, 1–10.
3. Begley, C.M. Intervention or interference? The need for expectant care throughout normal labour. Sex. Reprod. Healthc. 2014, 5, 160–164.
4. Dixon, L.; Tracy, S.K.; Guilliland, K.; Fletcher, L.; Hendry, C.; Pairman, S. Outcomes of physiological and active third stage labour care amongst women in New Zealand. Midwifery 2013, 29, 67–74.
5. Grotegut, C.A.; Paglia, M.J.; Johnson, L.N.C.; Thames, B.; James, A.H. Oxytocin exposure during labor among women with postpartum hemorrhage secondary to uterine atony. Am. J. Obstet. Gynecol. 2011, 204, 56.e1–56.e6.
6. Saxton, A.; Fahy, K.; Hastie, C. Effects of skin-to-skin contact and breastfeeding at birth on the incidence of PPH: A physiologically based theory. Women Birth 2014, 27, 250–253.
7. Fahy, K.; Hastie, C.; Bisits, A.; Marsh, C.; Smith, L.; Saxton, A. Holistic physiological care compared with active management of the third stage of labour for women at low risk of postpartum haemorrhage: A cohort study. Women Birth 2015, 23, 146–152.
8. Hastie, C.; Fahy, K.M. Optimising psychophysiology in third stage of labour: Theory applied to practice. Women Birth 2009, 22, 89–96.
9. Karimi, F.Z.; Sadeghi, R.; Maleki-Saghooni, N.; Khadivzadeh, T. The effect of mother-infant skin to skin contact on success and duration of first breastfeeding: A systematic review and meta-analysis. Taiwan. J. Obstet. Gynecol. 2019, 58, 1–9.

10. Safari, K.; Saeed, A.A.; Hasan, S.S.; Moghaddam-Banaem, L. The effect of mother and newborn early skin-to-skin contact on initiation of breastfeeding, newborn temperature and duration of third stage of labor. Int. Breastfeed. J. 2018, 13, 1–8.
11. Mejbel, M.K.; Ali, R.M.; Assist, P.; Baghdad, N. Effectiveness of Skin- to Skin Contact on duration of third stage of labor in Baghdad Teaching Hospital: Comparative Study. Kufa J. Nurs. Sci. 2012, 2, 1–14.
12. World Health Organization. WHO Recommendations for the Prevention and Treatment of Postpartum Haemorrhage; World Health Organization: Geneva, Switzerland, 2012; 41p, Available online: (accessed on 26 March 2021).
13. Rcog, Royal College of Obstetricians and Gynaecologists. Prevention and Management of Post-Partum Haemorrhage. Green Top Guidelines 52. 2011. Available online: (accessed on 26 March 2021).
14. American College of Obstetricians & Gynecologists. ACOG practice bulletin no. 76: Postpartum hemorrhage. Obs. Gynecol. 2006, 108, 1039–1047.
15. Shields, L.E.; Goffman, D.; Caughey, A.B. ACOG practice bulletin: Clinical management guidelines for obstetrician-gynecologists. Obstet. Gynecol. 2017, 130, e168–e186.
16. Almutairi, W.M.; Ludington, S.M.; Quinn Griffin, M.T.; Burant, C.J.; Al-Zahrani, A.E.; Alshareef, F.H.; Badr, H.A. The Role of Skin-to-Skin Contact and Breastfeeding on Atonic Postpartum Hemorrhage. Nurs. Rep. 2020, 11, 1–11.
17. Almutairi, W.M. Incidences of Atonic Postpartum Hemorrhage and Related Risk Factors at a Tertiary Hospital in Saudi Arabia. Nurs. Rep. 2020, 10, 164–171.
18. Kramer, M.S.; Berg, C.; Abenhaim, H.; Dahhou, M.; Rouleau, J.; Mehrabadi, A.; Joseph, K.S. Incidence, risk factors, and temporal trends in severe postpartum hemorrhage. Am. J. Obstet. Gynecol. 2013, 209, 449.e1–449.e7.
19. Chelmow, D. Postpartum haemorrhage: Prevention. Clin. Evid. 2011, 4, 1410.
20. Calvert, C.; Thomas, S.L.; Ronsmans, C.; Wagner, K.S.; Adler, A.J.; Filippi, V. Identifying regional variation in the prevalence of postpartum haemorrhage: A systematic review and meta-analysis. PLoS ONE 2012, 7, e41114.
21. Bateman, B.T.; Berman, M.F.; Riley, L.E.; Leffert, L.R. The epidemiology of postpartum hemorrhage in a large, nationwide sample of deliveries. Anesth. Analg. 2010, 110, 1368–1373.
22. Grobman, W.A.; Bailit, J.L.; Rice, M.M.; Wapner, R.J.; Reddy, U.M.; Varner, M.W.; Thorp, J.M.J.; Leveno, K.J.; Caritis, S.N.; Iams, J.D.; et al. Frequency of and factors associated with severe maternal morbidity. Obstet. Gynecol. 2014, 123, 804–810.

23. Montufar-Rueda, C.; Rodriguez, L.; Jarquin, J.D.; Barboza, A.; Bustillo, M.C.; Marin, F.; Ortiz, G.; Estrada, F. Severe postpartum hemorrhage from uterine atony: A multicentric study. J. Pregnancy 2013, 2013, 525914.
24. Thompson, J.F.; Heal, L.J.; Roberts, C.L.; Ellwood, D.A. Women's breastfeeding experiences following a significant primary postpartum haemorrhage: A multicentre cohort study. Int. Breastfeed. J. 2010, 5, 1–12.
25. Maswime, S.; Buchmann, E. A systematic review of maternal near miss and mortality due to postpartum hemorrhage. Int. J. Gynecol. Obstet. 2017, 137, 1–7.
26. Feduniw, S.; Warzecha, D.; Szymusik, I.; Wielgos, M. Epidemiology, prevention and management of early postpartum hemorrhage—A systematic review. Ginekol. Pol. 2020, 91, 45–51.
27. Oyelese, Y.; Ananth, C.V. Postpartum hemorrhage: Epidemiology, risk factors, and causes. Clin. Obstet. Gynecol. 2010, 53, 147–156.
28. Su, C.W. Postpartum hemorrhage. Prim. Care 2012, 39, 167–187.
29. Lancaster, L.; Barnes, R.F.W.; Correia, M.; Luis, E.; Boaventura, I.; Silva, P.; Drygalski, A. Maternal death and postpartum hemorrhage in sub-Saharan Africa—A pilot study in metropolitan Mozambique. Res. Pract. Thromb. Haemost. 2020, 4, 402–412.
30. Nyfløt, L.T.; Sandven, I.; Stray-Pedersen, B.; Pettersen, S.; Al-Zirqi, I.; Rosenberg, M.; Jacobsen, A.F.; Vangen, S. Risk factors for severe postpartum hemorrhage: A case-control study. BMC Pregnancy Childbirth 2017, 17, 1–9.
31. Sheldon, W.R.; Blum, J.; Vogel, J.P.; Souza, J.P.; Gülmezoglu a, M.; Winikoff, B.; on behalf of the WHO Multicountry Survey on Maternal and Newborn Health Research Network. Postpartum haemorrhage management, risks, and maternal outcomes: Findings from the World Health Organization Multicountry Survey on Maternal and Newborn Health. BJOG Int. J. Obstet. Gynaecol. 2014, 121, 5–13.
32. Lisonkova, S.; Mehrabadi, A.; Allen, V.M.; Bujold, E.; Crane, J.M.G.; Gaudet, L.; Gratton, R.J.; Ladhani, N.N.N.; Olatunbosun, O.A.; Joseph, K.S. Atonic Postpartum Hemorrhage: Blood Loss, Risk Factors, and Third Stage Management. J. Obstet. Gynaecol. Can. 2016, 38, 1081–1090.e2.
33. WHO. WHO Recommendations for the Prevention of Postpartum Haemorrhage; WHO: Geneva, Switzerland, 2006; pp. 1–6. Available online: (accessed on 26 March 2021).
34. Driessen, M.; Bouvier-Colle, M.H.; Dupont, C.; Khoshnood, B.; Rudigoz, R.C.; Deneux-Tharaux, C.; Pithagore6 Group. Postpartum hemorrhage resulting from uterine atony after vaginal delivery: Factors associated with severity. Obstet. Gynecol. 2011, 117, 21–31.
35. Clark, S.L. Obstetric hemorrhage. Semin. Perinatol. 2016, 40, 109–111.

36. Ekin, A.; Gezer, C.; Solmaz, U.; Taner, C.E.; Dogan, A.; Ozeren, M. Predictors of severity in primary postpartum hemorrhage. Arch. Gynecol. Obstet. 2015, 292, 1247–1254.
37. Lutomski, J.E.; Byrne, B.M.; Devane, D.; Greene, R.A. Increasing trends in atonic postpartum haemorrhage in Ireland: An 11-year population-based cohort study. BJOG Int. J. Obstet. Gynaecol. 2012, 119, 306–314.
38. Al-Kadri, H.M.; Tariq, S.; Tamim, H.M. Risk factors for postpartum hemorrhage among Saudi women. Saudi Med. J. 2009, 30, 1305–1310.
39. Manuscript, A. NIH Public Access. Changes 2012, 29, 997–1003.
40. Saxton, A.; Fahy, K.; Hastie, C. Pronurturance Plus at birth: A risk reduction strategy for preventing postpartum haemorrhage. Women Birth 2016, 29, 279–284.
41. Zimet, G.D.; Dahlem, N.W.; Zimet, S.G.; Farley, G.K. The Multidimensional Scale of Perceived Social Support. J. Pers. Assess. 1988, 52, 30–41.
42. Begley, C.M.; Gyte, G.M.; Devane, D.; McGuire, W.; Weeks, A. Active versus expectant management for women in the third stage of labour. Cochrane Database Syst. Rev. 2011, 9, CD007412, Update in: Cochrane Database Syst Rev. 2015;3:CD007412.
43. Mehrabadi, A.; Hutcheon, J.A.; Lee, L.; Kramer, M.S.; Liston, R.M.; Joseph, K.S. Epidemiological investigation of a temporal increase in atonic postpartum haemorrhage: A population-based retrospective cohort study. BJOG Int. J. Obstet. Gynaecol. 2013, 120, 853–862.
44. Begley, C.M.; Gyte, G.M.; Devane, D.; McGuire, W.; Weeks, A. Active versus expectant management for women in the third stage of labour. Cochrane Database Syst. Rev. 2015, 2, CD007412, Update in: Cochrane Database Syst Rev. 2019 Feb 13;2:CD007412.
45. Bingham, D.; Jones, R. Maternal Death from Obstetric Hemorrhage. J. Obstet. Gynecol. Neonatal Nurs. 2012, 41, 531–539.
46. Bell, A.F.; Erickson, E.N.; Carter, C.S. Beyond labor: The role of natural and synthetic oxytocin in the transition to motherhood. J. Midwifery Women's Health 2014, 59, 35–42.
47. Kenkel, W.M.; Yee, J.R.; Carter, C.S. Is Oxytocin a Maternal-Fetal Signaling Molecule at Birth? Implications for Development. J. Neuroendocrinol. 2014, 26, 739–749.
48. Chua, S.; Arulkumaran, S.; Lim, I.; Selamat, N.; Ratnam, S.S. Influence of breastfeeding and nipple stimulation on postpartum uterine activity. Br. J. Obstet. Gynaecol. 1994, 101, 804–805.
49. Lowe, N.K. The persistent problem of postpartum hemorrhage. J. Obstet. Gynecol. Neonatal Nurs. 2012, 41, 459–460.
50. Pejovic, N.J.; Herlenius, E. Unexpected collapse of healthy newborn infants: Risk factors, supervision and hypothermia treatment. Acta Paediatr. Int. J. Paediatr. 2013, 102, 680–688.

51. Handlin, L.; Jonas, W.; Petersson, M.; Ejdebäck, M.; Ransjö-Arvidson, A.B.; Nissen, E.; Uvnäs-Moberg, K. Effects of sucking and skin-to-skin contact on maternal ACTH and cortisol levels during the second day postpartum-influence of epidural analgesia and oxytocin in the perinatal period. Breastfeed. Med. 2009, 4, 207–220.