Oxytocin for Prevention of Postpartum Hemorrhage vs. No Uterotonics

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PICOT & Objective

Is oxytocin effective in preventing postpartum hemorrhage compared to the use of no uterotonics in women following vaginal and cesarean delivery?

P- Women postpartum in hospital setting
I- Intravenous administration of Oxytocin
C- The use of no uterotonics
O- Prevention of postpartum hemorrhage

Objective:

- To utilize evidence-based research to investigate whether oxytocin is effective in reducing postpartum hemorrhage (PPH) in women
- To conduct a literature review on current articles on PPH and oxytocin use

Background & Significance

Background:

- **Postpartum hemorrhage:** blood loss >1,000 mL or blood loss with signs of hypovolemia within 24 hours following vaginal or cesarean birth (Evensen et al., 2017)
  - Can be caused by **uterine atony, birth trauma, retained placenta or tissue, and clotting issues (thrombin)** (Evensen et al., 2017)
- The use of oxytocin (Pitocin) has been widely known to reduce the risk of postpartum hemorrhage in women
  - Recommended dose of oxytocin is **IM/IV 10 IU during the third stage of labor** (World Health organization, 2014)
  - **Oxytocin's** role is to encourage uterine contractions, in turn preventing postpartum bleeding

Significance:

- Postpartum hemorrhage has been deemed a leading predictor of health for women of childbearing age
- Leading cause of maternal morbidity and mortality in the year of 2019 alone (Andrikopoulou et al., 2019)
- Most deaths due to PPH complications occur during the first 24 hours following birth
  - Research on prophylactic use of uterotonics and active management during the third stage of labor can significantly improve maternal and infant outcome

Methods

- Literature was found on CINAHL, PubMed, EMBASE and Medline databases
- Keywords/phrases that were included: postpartum hemorrhage, oxytocin/Pitocin, vaginal and/or cesarean delivery, no uterotonics
- Inclusion criteria: peer-reviewed and published after 2010

Literature Review

Study/Author/Year	Elements of Study	Significant Findings
Active management of the third stage of labor with IV oxytocin and the risk of PPH (Jangsten et al., 2011)	• Randomized control trial – Level I, Quality of evidence: A • N=1802 (healthy women with normal singleton pregnancies and expected vaginal birth) • Active management of third stage of labor (cord clamping, IV oxytocin, uterine massage, and verbal encouragement) vs. Expectant management (cord clamping, IV saline solution, uterine massage, verbal encouragement) • Risk of PPH measured with total blood loss following delivery (mL) • Mann-Whitney U-test and Fisher's exact test used	• Women that were actively managed with oxytocin had significantly lower overall mean blood loss (mL) both before and after placenta expulsion (P<0.001) • 10% of actively managed women had blood loss >1000 mL but 16.8% of those who were expectantly managed had severe blood loss (P<0.001)
A standardized oxytocin administration protocol after delivery to reduce the treatment of PPH (Doyle et al., 2019)	• Retrospective cohort study- Level II Quality: A • N = 16,811 (46.3% in delivery pre-protocol introduction group and 53.7% in delivery post-protocol introduction group) • Pre-protocol (PREP) group: **oxytocin concentration of 20 units in 2000 mL** • Post-protocol (POSTP) group: **oxytocin concentration of 60 units over 5.25 hours post delivery** • Postpartum hemorrhage and the need for treatment following intervention was determined	• The outcome rate of postpartum hemorrhage was lower after the introduction of the protocol with an increased oxytocin concentration (7.0% vs. 4.6%)
Route of postpartum oxytocin administration and maternal hemoglobin decline (Ashwal et al., 2022)	• Randomized Controlled Trial- Level I Quality: B • Evaluate effectiveness of oxytocin regimens postpartum to reduce blood loss during third stage of labor • N= 210 (women 18 or older, singleton vaginal delivery, greater than or equal to 37 weeks gestation) • Oxytocin regimen divided into three groups: IM (10 units), IV (10 units in 100 ml 0.9% NaCl over 10-15 min), and IM+IV • Measured Hb decline between prepartum and postpartum • Shapiro-Wilk test, ANOVA, and Chi-Square tests used	• Postpartum Hb and Hct decline was minor following vaginal delivery (minimal blood loss) • IM, IV, and IM + IV had similar impact on the rate of Hb and Hct decline
Routine use of prophylactic oxytocin in the third stage of labor to reduce maternal blood loss (Kuzume et al., 2017)	• Prospective cohort and historical cohort study – Level II, Quality of evidence: A • N= 799 (women with singleton vaginal deliveries; average age of 30 years; gestational age of about 38 weeks) • Routine use of prophylactic oxytocin (RUPO) vs. Physician-selective use of oxytocin • Volume of maternal blood loss during the first 2 hours after delivery and the prevalence of PPH was assessed • T-tests and chi-squared tests used	• RUPO group had 20% less maternal blood loss compared to the control group (P<0.001) • PPH incidence (women with severe bleeding greater than or equal to 1,000 mL) was significantly lower in the RUPO group (6.1%) compared to the control group (14%, P<0.001)
Intramuscular versus intravenous oxytocin for the third stage of labor after vaginal delivery to prevent postpartum hemorrhage (Zhou et al., 2020)	• Metanalysis of randomized controlled trials- Level I Quality: A • Focus on women undergoing vaginal delivery with the use of oxytocin • N= 7320 • Subgroups: intramuscular administration of oxytocin vs. intravenous administration of oxytocin • Based on IV, incidence of postpartum hemorrhage **(blood loss ≥ 500 mL)** within 24 hours after vaginal birth and severe postpartum hemorrhage **(blood loss ≥ 1000 mL)** within 24 hours of vaginal birth) was recorded.	• Women who received intravenous oxytocin had significantly lower incidence of PPH (1.35 risk) • Women who were randomized to have IV oxytocin had significantly lower rate of severe PPH (1.61 risk) • Women who were randomized to have intravenous oxytocin had significantly lower incidence of blood transfusion (relative risk of 2.50), compared to those randomized to have IM oxytocin.
An evidence-based oxytocin protocol for the third stage of labor to improve hemorrhage outcomes (Gonzalez et al., 2021)	• Cohort Study- Level IV Quality: B • Evaluate if implementing evidence-based oxytocin protocol will improve clinical outcomes • N= 14603 (8408 pre-protocol and 6195 post-protocol) • Protocol was 3 units oxytocin delivered over 3 min, 3-unit bolus if inadequate tone, infusion at 18 units/1 hour x 1 hour, and then 3.6 units/hour for 3 hours • Postpartum hemorrhage rate (EBL ≥500 ml for vaginal and ≥1000 ml for cesarean) • P-charts, Fisher's exact test, Mann-Whitney U-test, and Minitab 18 used	• A significant decrease in PPH from 5.2% to 2.9% (P<0.001) • The standardized oxytocin protocol resulted in a significant decrease in PPH for both vaginal and cesarean deliveries

Synthesis

Based on the literature above, the administration of oxytocin has demonstrated to be effective at preventing the occurrence of postpartum hemorrhage, as well as lessening the severity of postpartum blood loss following delivery, in comparison to the use of no uterotonics. Oxytocin is suggested to be used intravenously or intramuscularly during the third stage of labor, following both vaginal delivery and cesarean section, as a prophylactic for postpartum hemorrhage.

Implications for Nursing Practice

- Oxytocin is an effective uterotonic drug that should be implemented into the active management of the third stage of labor (World Health Organization, 2012)
- Intravenous administration of oxytocin is the recommended route of administration for the prevention of postpartum hemorrhage, in comparison to the intramuscular route (Zhou et al., 2020).
- Prophylactic use of oxytocin should be encouraged to reduce maternal blood loss and incidence of PPH after vaginal and cesarean delivery

Future Research

- More evidence-based research is needed on the specific administration and dosing of oxytocin
- Other factors that play into postpartum hemorrhage management should be investigated to ensure the efficacy of oxytocin (Jangsten et al., 2011)
  - Rate of blood loss, clinical signs, the shock index, and physiological responses
- Further research should explore the differences in the impact of oxytocin after vaginal and cesarean delivery

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