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Prophylactic Tranexamic Acid Administration to Prevent Postpartum Hemorrhage After Cesarean Delivery in Patients at High Risk of Severe Postpartum Bleeding

Alexandra White

Stephanie Lafikes
SIUE

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Alexandra L. White and Stephanie M. Lafikes

Southern Illinois University-Edwardsville

Problem Statement

PPH is the leading cause of maternal death in developing countries worldwide. The World Health Organization (WHO) estimates that 27% of all maternal deaths result from postpartum hemorrhage (Omotayo, 2021). The American College of Obstetricians and Gynecologists (ACOG) recently updated its definition of postpartum hemorrhage (PPH) as an estimated blood loss of 1,000 mL or greater, accompanied by signs and symptoms of hypovolemia within 24 hours of delivery (Allen, 2017).

The obstetric care team at a level III perinatal center in central Illinois was currently following the guidelines of the WHO regarding the administration of TXA in all patients who experience PPH. However, they were not using this drug prophylactically to prevent PPH in patients who were at risk. This care team was eager to learn about the research that had been done specifically on the use of TXA as a prophylactic agent in this patient population.

Literature Review

Physiologically, there are two ways that uterine bleeding stops after childbirth and the delivery of the placenta. Uterine vessels mechanically compress in the presence of adequate uterine muscle tone, and intravascular coagulation occurs if the clotting cascade is functional and adequate clotting factors are present in maternal circulation (Bouthors et al., 2021). Poor uterine muscle tone is implicated in up to 80% of PPH cases, and historically uterotonic drugs have been the primary pharmacologic agent used to treat and prevent PPH (Mielke & Obermeyer, 2020). However, the findings of the CRASH-2 trial released in 2010 revealed important information about the benefit of administering tranexamic acid (TXA), an antifibrinolytic medication, in the treatment of hemorrhage. The WHO's current recommendation is that TXA should be administered within three hours after diagnosing PPH.

Blood loss can accumulate rapidly in the hemorrhaging postpartum patient, with an average blood flow of 0.5 liters per minute to the uterus at term gestation (Ahmadzia et al., 2021). Thus, a focus on preventing PPH is essential, especially in patients with known risk factors for PPH. The rate of childbirth via cesarean section (CS) has increased worldwide, and blood loss is statistically higher during CS when compared to vaginal delivery (Sahu & Mishra, 2019). Potential clinical implications of PPH include: the need for blood transfusion, prolonged postpartum recovery, increased length of hospital stay, organ damage, decreased fertility, impaired mother-baby bonding, and psychological distress.

In this literature review, the administration of prophylactic TXA was consistently associated with a statistically significant reduction in EBL related to cesarean section. Additionally, multiple studies showed TXA administration was associated with a decreased risk of needing a blood transfusion postoperatively. Data from three sizeable trials showed no statistically significant increase in severe adverse events- including thromboembolic events and seizures-related to the use of TXA (Sentilhes et al., 2021; Shakur et al., 2010; Shakur et al., 2017). In this literature review, the most common adverse events associated with IV TXA administration included mild and transient GI distress such as nausea, vomiting, and diarrhea.

Project Methods

This project was a non-experimental pre-test, post-test design involving obstetrical providers, obstetrical anesthesia providers, and obstetrical staff at a tertiary perinatal center. Participants' knowledge on postpartum hemorrhage (PPH) and tranexamic acid (TXA) was assessed before and after a live PowerPoint presentation via Qualtrics, utilizing the same questions to identify continued gaps in knowledge regarding the content. The PowerPoint presentation was presented to the host facility and included the most recent and relative research

on tranexamic acid (TXA), highlighting the use of TXA in postpartum hemorrhage (PPH) protocols.

Internal stakeholders and mentors involved in the development and implementation of this survey and presentation included Dr. Mary Zerlan, DNP, CRNA, APRN serving as project lead from Southern Illinois University Edwardsville, and Whitney Heischmidt, DNP, CRNA, APRN project faculty team member and content expert. The external stakeholder from the host hospital was Rebecca Collier, DNP, CRNA, APRN. This DNP project was submitted to IRB at Southern Illinois University Edwardsville as a quality improvement project and was deemed exempt from SIUE IRB approval.

Evaluation

This doctoral project and its presentation evaluated providers associated with obstetrics and their knowledge of postpartum hemorrhage (PPH) and tranexamic acid (TXA) use in this patient population. Participants were asked to complete a 10-question pre- and post-presentation questionnaire to measure knowledge and opinion on the topic, with a format consisting of multiple choice, true/false, yes/no, and open text.

Following the presentation, a review of responses was completed to compare knowledge gained, hesitations to implementing the recommended change, and the providers' willingness to consider the change. In analyzing the nine measurable pre- and post-presentation responses, six questions improved scoring, two had no change from 100% correct, and one had no change from 92.31%. Considering 88.89% of the responses resulted in either improvement or a 100% score, PowerPoint can be seen as an effective instrument in improving knowledge on the subject.

The pre-and post-test results demonstrated an improvement in knowledge related to postpartum hemorrhage and the use of TXA. Additionally, several areas in which additional

research is necessary include patients with known risk factors for PPH, and the safest and most effective dose and timing. This project highlighted the safety and efficacy of prophylactic TXA administration in the OB population and the need for future research to maximize the potential benefit of this therapy.

Impact to practice

Improving knowledge in healthcare providers will improve patient outcomes. In addition, the current evidence has the potential to decrease postpartum hemorrhage. Decreasing the potential for postpartum hemorrhage will benefit the patient and the infant. The postpartum period is the initial bonding period between the mother and the infant, in which a mother's well-being is essential. Therefore, this improvement in knowledge will benefit the family as a whole, and a postpartum period without complications will decrease hospital stays and possible intensive care unit admission.

Conclusion

This literature review provided evidence of tranexamic acid (TXA) demonstrating a statistically significant decrease in PPH, specifically if administered within three hours of PPH diagnosis. Since TXA has been classified as a pregnancy risk category B, its use to decrease PPH risk should be seriously considered, especially in high-risk parturients. Despite these consistent conclusions and that the benefit may outweigh the risk, more vigorous studies are needed to explore the use and outcomes of prophylactic TXA administration.

The goal was for the targeted audience to seriously consider and use TXA as a prophylactic option to prevent PPH in high-risk populations. By utilizing the same pre and post-test assessment regarding TXA and its use, an informational presentation outlined the preexisting gaps in knowledge and the ones that remained following the education. In addition, a yearly

review of the current information with new relevant information will benefit healthcare providers and patients.

Author Contact Information

Alexandra White, SRNA, BSN, NA-DNP student

awhitah@siue.edu

Stephanie Lafikes, SRNA, BSN, NA-DNP student

slafike@siue.edu