Effect of Sequential Tranexamic Acid Timing Strategies on Postpartum Hemorrhage After Cesarean Delivery: A Multi-Phase Quality Improvement Evaluation

Ruhi Patil[1], Erin Dienes, Ph.D.[1], Celina Nguyen[1], Kerwin Wang[1], Xuan He, Ph.D.[1], Mark Norris, M.D[1], Rachel A. Achu-Lopes, M.D[1].
1: Department of Anesthesiology, Boston Medical Center, Boston University Chobanian & Avedisian School of Medicine, Boston, Massachusetts

Background and Hypothesis

- Postpartum hemorrhage (PPH) remains a leading cause of pregnancy-related morbidity and mortality.[1]
- Prophylactic TXA has demonstrated variable benefit in cesarean delivery, with outcomes differing by timing and clinical context.[2]

Phase 1

Our institution implemented universal TXA dosing at cord clamp in 2021

↓

No meaningful reduction in hemorrhage or transfusion

Phase 2

Based on a growing body of literature suggesting potential benefit with earlier antifibrinolytic exposure,[3] our department transitioned to pre-incision TXA dosing in March 2025.

↓

This analysis represents Phase 2 of the initiative

BOSTON UNIVERSITY

Study Design and Methods

We conducted a single-center retrospective analysis of cesarean deliveries from January 2020 to September 2025 across three sequential practice periods:

- No routine TXA
- TXA administered at umbilical cord clamp
- TXA administered 10–15 minutes prior to skin incision

Primary Outcomes

Median Quantitative Blood Loss (QBL) and Postpartum Hemorrhage (PPH; QBL >1000 mL)

Secondary Outcomes

Additional uterotonic , Red blood cell transfusion, and ICU admission.

Analysis

Continuous variables were compared using ANOVA with Tukey post hoc testing, and categorical variables using chi-square or Fisher's exact tests.

*All TXA doses were 1 g IV

BOSTON UNIVERSITY

Results

5,454 cesarean deliveries

Median Quantitative Blood Loss differed modestly across groups (832 mL [IQR 593–1158] no TXA; 866 mL [617–1217] TCC; 833 mL [587–1163] TBI; p=0.022), driven by slightly higher blood loss in the TCC group.

Rates of Postpartum hemorrhage (QBL > 1000) were similar (34.8%, 38.2%, and 35.5%, respectively; p=0.056).

Additional uterotonic use differed significantly, with higher utilization in the TCC group and lower utilization in the TBI group (25.5%, 32.8%, and 14.6%, respectively; p< 0.001).

Red blood cell transfusion by postoperative day two and overall transfusion rates were higher in TXA groups compared with no TXA (p=0.016 and p=0.013), although mean units transfused did not differ (p=0.462).

ICU admission rates were low and similar across groups (p=0.166)

Outcome	No TXA (N = 1819)	TXA at Cord Clamp (TCC) (N = 3150)	TXA Before Skin Incision (TBI) (N = 485)	p-value
Quantitative Blood Loss median (IQR)	832 (593, 1158)	866 (617, 1217)	833 (587, 1163)	0.022*
Postpartum hemorrhage (QBL > 1000) # (%)	589 (34.8%)	1188 (38.2%)	172 (35.5%)	0.056
Additional uterotonic agents for excessive bleeding # (%)	464 (25.5%)	1034 (32.8%)	71 (14.6%)	<0.001
Admitted to ICU # (%)	29 (1.6%)	32 (1.0%)	4 (0.8%)	0.166
Red-cell transfusion by day 2 # (%)	101 (5.6%)	215 (6.8%)	44 (9.1%)	0.016
Blood transfusion # (%)	106 (5.8%)	228 (7.2%)	46 (9.5%)	0.013
No. of red-cell units transfused Mean ± SD	0.17 ± 1.0	0.17 ± 0.7	0.21 ± 0.8	0.462

*Tukey's multiple comparisons show that TXA at cord clamp is significantly larger than No TXA and the other pairwise comparisons are not significantly different.

Effect of Sequential Tranexamic Acid Timing Strategies on Postpartum Hemorrhage After Cesarean Delivery: A Multi-Phase Quality Improvement Evaluation

BOSTON UNIVERSITY

Conclusion and Discussion

- Consistent with Phase 1, **advancing TXA administration from cord clamp to pre-incision was not associated with meaningful reductions in QBL or PPH** in this early Phase 2 analysis.
- Observed differences likely reflect underlying patient risk and surgical complexity rather than treatment effect.
- These findings support a risk-stratified rather than universal approach to prophylactic TXA use in cesarean delivery.

References:
1. Cresswell, J., et al. Lancet Glob Health. 2025;13:e626–e634.
2. Rohwer, C., et al Cochrane Database Syst Rev. 2024;11:CD016278.
3. Gayet-Ageron, A., et al. Lancet. 2018;391:125–132.

BOSTON UNIVERSITY