

Association of Intravenous Fluid Administration in Labor and Postpartum Hemorrhage

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Background

- Postpartum hemorrhage (PPH) rates have increased the last 20 years.¹
- To date, research into etiologies of postpartum hemorrhage has not significantly improved prediction or prevention of PPH in clinical practice.
- Patients often receive large volumes of intravenous (IV) fluids during labor.

Trauma surgery research has demonstrated an association between large volume fluid resuscitation with coagulopathy and worsened outcomes.²

Objective

- To identify a possible link between intrapartum IV fluid administration and rates of postpartum hemorrhage.
- To identify any other intrapartum predictors of PPH.

Methods

Cohort:

Hospitalizations resulting in spontaneous vagina delivery (SVD) in a nationwide hospital system from 2020 to 2022 after admission for spontaneous labor in patients age 18 to 55 years with low risk of PPH (n=4,124).

Exclusion criteria:

- Labor induction or augmentation
- Factors that increased risk of PPH, including placenta previa or accreta spectrum, multiple gestation, history of uterine surgery, polyhydramnios, chorioamnionitis, large for gestation fetus, fetal malpresentation, history of more than 4 prior deliveries
- Documentation of medium or high risk of hemorrhage

Variables of interest:

Total fluid shift in labor	Gestational age
Length of labor	COVID infection
Epidural in labor	Epidural usage
Anemia at admission	Tranexamic acid (TXA) administered
Thrombocytopenia at admission	Laceration

Binary logistic regression with Firth correction was used to reduce bias due to PPH being a rare outcome

Results

Table 1: Demographics

	Overall N=4,124	No PPH N=4,031	PPH N=93
Age (years)	28.0±5.5	28.0±5.5	28.3±5.6
Race			
White	1971 (48)	1931 (48)	40 (43)
Non-white*	2153 (52)	2100 (52)	53 (57)
BMI (kg/m ²)	30.2±5.0	30.2±5.0	30.7±5.4

Data are mean±SD or n (%) unless otherwise specified
*Includes African American, Asian, Native American, multiracial, & other

Table 2: Encounter Characteristics

	Overall N=4,124	No PPH N=4,031	PPH N=93	p-value
Admission & Labor Characteristics				
Intake fluid shift, total (mL)	2,013±1,289	1,998±1,278	2,637±1,578	<0.0001
Output fluid shift, total (mL)	1,474±1,354	1,435±1,295	3,109±2,390	
Anemia at admission	1063 (26)	1038 (26)	25 (27)	0.0423
Length of labor (hours)	12.5±18.0	12.6±18.2	11.4±8.2	0.6865
Epidural in labor	2123 (52)	2088 (52)	35 (38)	0.0103
Delivery & Postpartum Characteristics				
Blood product transfusion‡	55 (1)	34 (1)	21 (23)	
Laceration	2418 (59)	2360 (59)	58 (62)	0.66
1 st or 2 nd degree	2243 (54)	2193 (54)	50 (53)	
3 rd or 4 th degree	76 (2)	71 (2)	5 (5)	

Data are mean±SD or n (%) unless otherwise specified
*Hemoglobin < 11.0 at admission
‡ Includes packed red blood cells, platelets, or other blood products such as fresh frozen plasma or cryoprecipitate

Discussion

- PPH complicated 2.3% of SVDs after admission for spontaneous labor

The total IV fluid volume administered was significantly associated with increased likelihood of PPH.

- Controlled for age, gestational age, anemia on admission, epidural anesthesia, smoking, COVID-19 infection, thrombocytopenia, length of labor, laceration, and use of TXA.

Epidural anesthesia was associated with lower likelihood of PPH after controlling for total intake fluid shift in addition to the factors listed above.

- Patient's with epidurals were less likely to have a blood transfusion even when controlled for total fluid intake, length of labor, and laceration.
- Among patient who received blood transfusion (n=55), total volume of blood transfusion was higher in patients who did not have epidurals after controlling for total intake fluid shift.

Conclusion

- IV fluids during labor may be associated with increased risk of PPH in patients without any other identified risk factors.
- Delivery via SVD without epidural anesthesia may be associated with increased risk of PPH.
- The ideal amount of intravenous fluid in labor is currently unknown and future prospective studies may help guide clinical practice.

References

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