

Evaluating blood loss at Caesarean section: a haemorrhage risk-based prospective study

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INTRODUCTION

Accurate blood loss assessment at Caesarean section is essential as postpartum haemorrhage (PPH) is a leading cause of maternal morbidity and mortality worldwide. PPH risk assessment tools, such as the California Maternal Quality Care Collaborative (CMQCC) tool, have moderate accuracy in predicting PPH. The CMQCC risk assessment tool stratifies patients into three haemorrhage risk categories (low, medium and high risk) based on patient-level risk factors. Could the low predictive value of these PPH risk assessment tools be the result of *how* blood loss is evaluated at delivery? Studies evaluating current blood loss evaluation methodology may help endorse novel approaches to blood loss assessment. We assumed that an increase in PPH risk would equate to an increase in blood loss evaluation activities in terms of time spent evaluating blood loss and resource utilization.

OBJECTIVE

To study whether blood loss evaluation at Caesarean delivery is influenced by obstetric haemorrhage risk.

METHODS

This prospective study was performed at a Cork University Maternity Hospital in Ireland. Patients undergoing Caesarean delivery were recruited. Patient risk factors for PPH were documented according to the California Maternal Quality Care Collaborative (CMQCC) risk assessment tool. In addition to collecting patient demographic information, we recorded direct observations of activities relating to blood loss measurement, calculation and documentation.

The Shapiro-Wilk Test was used to study the normal distribution of the data. Parametric data is presented as mean $\pm$ standard deviation and nonparametric data is presented as median with range. One-Way ANOVA was used on parametric data and the Kruskal-Wallis H Test on nonparametric data. The significance level was set at p value <0.05 . Ethical approval for the study was granted by the Clinical Research Ethics Committee of the Cork Teaching Hospitals (Ref: ECM 5 (4) 02/12/2021 and ECM 4 (h) 19/10/2021).

TABLE 1 - Patient demographics and Caesarean delivery indication according to obstetric haemorrhage risk category. Data presented as mean $\pm$ standard deviation or median (range).

	Obstetric Haemorrhage Risk Category			p-value
	Low (n=27)	Medium (n=54)	High (n=19)	
Age (Years)	35 $\pm$ 5	36 $\pm$ 4	35 $\pm$ 4	0.592
Gravida (n)	1 (1 – 6)	3 (1 – 6)	3 (1 – 6)	<0.001
Parity (n)	0 (0 – 2)	1 (0 – 4)	1 (0 – 4)	<0.001
BMI (kg/m ²)	28 (22 – 40)	27 (19 – 47)	29 (20 – 44)	0.368
Gestation (Week ^{+Day})	38 ⁺⁵ (37 ⁺⁰ – 41 ⁺³)	38 ⁺⁵ (37 ⁺⁰ – 41 ⁺⁰)	38 ⁺⁰ (32 ⁺³ – 41 ⁺³)	0.183
Multiple Gestation (n)	0	1	6	-
Total Delivery Weight (kg)	3.52 (2.28 – 4.16)	3.44 (2.86 – 4.86)	3.70 (2.32 – 5.38)	0.156
Delivery Indication (n)				
Elective	17	51	14	-
Emergency	10	3	5	

RESULTS

One hundred Caesarean section patients were recruited for the study. We classified 27 patients as low risk, 54 patients as medium risk and 19 patients as high risk for PPH (Table 1). In most patients' (84%), estimated blood loss were determined through suction canister blood volume measurements, and estimating blood volume in blood soiled surgical swabs without swab weighing (Table 2). A higher percentage of patients in the high risk group (40%) had swab weighing compared to the low risk (19%) and medium risk (7%) groups. Between risk groups, there was no significant difference between time spent swabbing and suctioning when compared to operating time as well as resource utilization.

CONCLUSION

Evaluation of blood loss at Caesarean sections was not uniform across PPH risk groups. Cognitive bias could affect blood loss quantification and prevent standardised blood loss evaluation. This could be reduced by objective and automated blood loss quantification tools.

TABLE 2 - Caesarean delivery blood loss evaluation activities according to obstetric haemorrhage risk category. Data presented as mean $\pm$ standard deviation or median (range).

	Obstetric Haemorrhage Risk Category			p-value
	Low (n=27)	Medium (n=54)	High (n=19)	
Estimated Blood Loss (mL)	450 (300 – 2000)	400 (300 – 850)	500 (400 – 5700)	0.009
Blood Loss $\geq$ 500mL (n)	11	17	11	-
Primary Surgeon Experience				
< 3 Years	8	16	8	-
3 to 9 Years	7	13	5	
> 9 Years	12	25	6	
Assistant(s)	1 (1 – 1)	1 (1 – 2)	1 (1 – 3)	0.028
Surgical Swabs Used (n)	7 (4 – 15)	7 (5 – 15)	9 (5 – 31)	0.122
Swabs Weighed (%)	19 (5)	7 (4)	40 (7)	-
Suction Volume (mL)	500 (50 – 1750)	500 (50 – 1600)	900 (300 – 5200)	0.115
Operating Time (min)	37 (16 – 59)	44 (18 – 105)	42 (21 – 72)	0.044
Swabbing Time (sec)	41 (10 – 112)	52 (21 – 134)	53 (16 – 237)	0.241
Swabbing Time (%)	2.21 (0.33 – 5.19)	1.86 (0.85 – 6.30)	1.91 (1.01 – 5.49)	0.922
Suction Time (sec)	35 (8 – 93)	44 (9 – 120)	67 (19 – 536)	0.031
Suction Time (%)	1.86 (0.36 – 6.46)	1.5 (0.19 – 10.83)	2.44 (0.62 – 12.4)	0.159
Staff Calculating Blood Loss (n)	2 (2 – 3)	2 (2 – 3)	2 (2 – 6)	0.138
Revisions to Blood Loss (%)	7 (2)	0 (0)	5 (1)	0.152
Blood Loss Documenting Time				
< 1 min	27	54	18	-
> 1 min	0	0	1	

CONTACT INFORMATION

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