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Association between Volume of Fluid Resuscitation in the Management of Postpartum Haemorrhage and Maternal Morbidity

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Introduction

Postpartum haemorrhage (PPH) continues to be the leading cause of maternal mortality in developing countries and a leading cause of maternal mortality and morbidity in Australia. In trauma research for severe haemorrhage, resuscitation with large volumes of crystalloid is associated with worsening haemorrhage, worsening coagulopathy and increased mortality. Despite recent changes in managing haemorrhage in trauma patients, postpartum haemorrhage is still typically treated with large volumes of intravenous fluids (IVF).

Methodology

Participants: All women with a primary PPH with an estimated blood loss of ≥1000ml after a singleton term vaginal delivery at the Sunshine Coast Hospital and Health Service between 1st July 2016 and 30th June 2019.

Design: Quantitative retrospective cohort study.

Data analysis: Univariate regression was used to determine associations between PPH risk factors and maternal outcomes

Variables with a p<0.1 were included in a multivariate regression analysis to determine if the volume of IVF was associated with maternal morbidity, defined as: ICU admission, surgical intervention and lowest postnatal haemoglobin of <90g/L.

Table 1: summary of morbidity outcomes by volume of IVF

Variable	<=2L	2-3L	3-4L	>4L
Morbidity (composite)				
No	118 (55%)	55 (50%)	18 (40%)	1 (6%)
Yes	98 (45%)	55 (50%)	27 (60%)	15 (94%)
Bakri balloon				
N	196 (91%)	98 (89%)	34 (76%)	9 (56%)
Y	20 (9%)	12 (11%)	11 (24%)	7 (44%)
Other surgical intervention				
Yes	31 (14%)	15 (14%)	9 (20%)	6 (37%)
No	185 (86%)	94 (86%)	36 (80%)	10 (63%)
ICU Admission				
N	216 (100%)	110 (100%)	44 (98%)	15 (94%)
Y	0 (0%)	0 (0%)	1 (2%)	1 (6%)
Lowest postnatal haemoglobin below 90 (mg/L)				
<90	85 (40%)	48 (44%)	24 (53%)	13 (81%)
>=90	128 (60%)	61 (56%)	21 (47%)	3 (19%)

Results

391 patients were included. From the univariate analyses, for every 1L increase in IVF the odds of having morbidity increased by a factor of 1.33 (p=0.002, 95% CI: 1.12, 1.6).

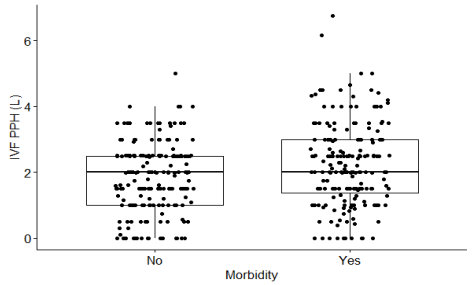

Figure 1: Box plots (overlaid with data points) of IVF given for those with and without morbidities.

After inclusion in the multivariate model, however, IVF volume was no longer significant. Other variables that significantly affected morbidity included forceps or vacuum assisted delivery with OR 3.1 and 2.25 respectively (p=0.003), total estimated blood loss (EBL) (OR 7.62, p<0.0001) and birthweight ≥4kg (OR 0.5, p=0.016).

Table 2: Univariate logistic regression analyses for predictors for morbidity in PPH patients

Variable	Effect size (OR)	95% CI	P
Forceps	3.279	1.523,7.672	0.0004
Vacuum	2.275	1.274,4.166	
Parity 3 or more	1.16	0.536,2.543	0.705
Age 35 and over	1.452	0.887,2.397	0.14
BMI 30 or more	0.81	0.428,1.518	0.511
Length 2nd Stage 2hrs or more	3.126	1.416,7.625	0.007
Induction	1.108	0.734,1.673	0.627
Augmentation	1.235	0.782,1.959	0.366
Perineal trauma	1.728	1.036,2.919	0.038
Birth Weight 4kg and above	0.63	0.385,1.022	0.063
Total EBL (L)	6.991	4.109,12.494	<0.0001

Conclusion

There was no significant difference in morbidity for larger volumes of IVF in the management of PPH. Given the results from Henriquez and colleagues(1), who demonstrated worsening maternal outcomes for IVF >4 litres, it is likely there were too few patients in the cohort that received large volumes (≥4L, n=16) of IVF.

1 Henriquez DDCA, Bloemenkamp KWM, Loeff RM, Zwart JJ, van Roosmalen JJM, Zwaginga JJ, et al. Fluid resuscitation during persistent postpartum haemorrhage and maternal outcome: A nationwide cohort study. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2019;235:49-56.