

Table S3. Changes in estimated blood loss (according to groups and sub-groups of risk factors as appropriate to pre-pregnancy, during pregnancy, labour and birth), principal predictors of postpartum haemorrhage (PPH) ≥ 500 ml and conditional predictors of progression to severe PPH ≥ 1500 ml; unadjusted associations.

Predictive variable	Mean change in EBL (ml)	Odds Ratio (OR) (95% CI)	
		≥ 500 ml	≥ 1500 ml
		All women	Women with PPH ≥ 500 ml
Group A: Pre-pregnancy			
Sub-group i: Age			
Age for each 10 years	67 (38 to 97)	1.46 (1.21 to 1.77)	0.97 (0.76 to 1.25)
Ethnicity			
White (reference group)			
Black British	-53 (-152 to 46)	0.46 (0.20 to 1.06)	2.01 (0.69 to 5.84)
Black Caribbean	-48 (-125 to 29)	1.01 (0.57 to 1.78)	0.47 (0.21 to 1.03)
Black African	128 (64 to 192)	1.68 (1.23 to 2.28)	1.13 (0.76 to 1.69)
Bangladeshi	-78 (-170 to 14)	0.56 (0.22 to 1.46)	0.62 (0.15 to 2.52)
Indian	117 (-33 to 267)	1.40 (0.73 to 2.67)	1.44 (0.45 to 4.64)
Pakistani	45 (-39 to 129)	1.13 (0.62 to 2.04)	1.09 (0.45 to 2.64)
Chinese	237 (34 to 441)	2.54 (0.73 to 8.82)	1.25 (0.46 to 3.41)
Other Asian	88 (-175 to 351)	1.35 (0.38 to 4.75)	0.73 (0.17 to 3.04)
Mixed	-96 (-174 to -19)	0.59 (0.26 to 1.33)	0.52 (0.15 to 1.76)
Other/unknown	90 (1 to 180)	1.01 (0.60 to 1.71)	1.27 (0.70 to 2.30)
Sub-group ii: Local deprivation			
IMD*: most deprived quintile	4 (-35 to 43)	1.00 (0.80 to 1.26)	0.96 (0.69 to 1.34)
Barriers to housing & services	61 (22 to 100)	1.29 (1.02 to 1.62)	0.87 (0.64 to 1.20)
Education, skills and training	-63 (-126 to 0)	0.57 (0.39 to 0.85)	1.98 (1.18 to 3.32)
Sub-group iii: General risk factors			
Current smoker	-82 (-142 to -22)	0.74 (0.51 to 1.07)	0.48 (0.29 to 0.80)
BMI per unit (Kg/m ²)	6 (1 to 10)	1.01 (0.99 to 1.04)	1.04 (1.01 to 1.07)
Anaemia (iron at first appointment)	6 (-151 to 163)	0.76 (0.24 to 2.43)	1.31 (0.35 to 4.95)
Essential hypertension	172 (-73 to 417)	2.09 (0.67 to 6.55)	0.40 (0.11 to 1.45)
Diabetes	34 (-121 to 189)	1.31 (0.40 to 4.25)	0.91 (0.26 to 3.17)

Depression	-49 (-128 to 29)	0.80 (0.39 to 1.64)	0.77 (0.31 to 1.89)
Epilepsy	46 (-120 to 212)	1.76 (0.33 to 9.44)	1.04 (0.22 to 4.99)
Lupus	-102 (-442 to 238)	0.48 (0.05 to 4.61)	#
Fibroids	116 (3 to 229)	1.60 (0.94 to 2.70)	0.87 (0.51 to 1.50)
FGM	75 (-32 to 181)	1.15 (0.60 to 2.19)	1.59 (0.83 to 3.08)
Clotting/ thrombotic disorders	189 (-32 to 411)	3.14 (0.91 to 10.90)	0.86 (0.32 to 2.32)
Uterine anomaly	-26 (-365 to 312)	1.44 (0.13 to 15.66)	0.82 (0.07 to 9.79)
Planned pregnancy	36 (-6 to 78)	1.06 (0.82 to 1.38)	1.35 (0.95 to 1.92)
Assisted conception	234 (107 to 360)	3.80 (1.69 to 8.57)	1.26 (0.63 to 2.54)
Gestation at booking	0 (-3 to 3)	1.00 (0.98 to 1.01)	0.98 (0.96 to 1.01)
Sub-group iv: Obstetric history			
Previous PPH	164 (7 to 320)	1.52 (0.86 to 2.68)	1.85 (1.01 to 3.40)
Number of previous PPH	153 (22 to 284)	1.62 (0.99 to 2.64)	1.57 (0.95 to 2.59)
Previous caesarean section	195 (118 to 273)	2.80 (2.00 to 3.94)	0.68 (0.43 to 1.05)
Parity (using 0 as reference group)			
1	-73 (-119 to -27)	0.64 (0.49 to 0.83)	1.18 (0.80 to 1.74)
2	-96 (-150 to -41)	0.62 (0.44 to 0.89)	1.67 (1.02 to 2.74)
3+	-77 (-161 to 7)	0.58 (0.37 to 0.91)	1.34 (0.77 to 2.31)
Multiparity	-80 (-118 to -42)	0.63 (0.50 to 0.79)	1.33 (0.97 to 1.83)
Group B: Pregnancy			
Sub-group v: Current pregnancy			
Multiple pregnancy	208 (90 to 326)	2.15 (1.05 to 4.41)	1.47 (0.80 to 2.70)
Number of fetuses	215 (100 to 330)	2.18 (1.11 to 4.29)	1.44 (0.82 to 2.53)
Antenatal admissions	42 (-10 to 94)	1.37 (1.01 to 1.87)	0.84 (0.58 to 1.23)
Admissions >24/40	54 (0 to 107)	1.52 (1.10 to 2.09)	0.80 (0.54 to 1.18)
Sub-group vi: Antenatal day unit (ADU)			
Any ADU attendance	49 (11 to 87)	1.28 (1.02 to 1.60)	1.25 (0.91 to 1.72)
>1 ADU attendance	27 (6 to 49)	1.15 (1.01 to 1.31)	1.08 (0.92 to 1.27)
Abdominal pain	11 (-35 to 57)	1.10 (0.81 to 1.50)	0.91 (0.63 to 1.31)
IM iron	512 (493 to 531)	#	#
Itching	39 (-76 to 155)	1.13 (0.54 to 2.40)	1.20 (0.55 to 2.63)
Pre-eclampsia screen	81 (12 to 150)	1.62 (1.07 to 2.43)	0.90 (0.59 to 1.37)

Growth scan	33 (-190 to 256)	0.40 (0.12 to 1.31)	1.64 (0.35 to 7.81)
Generally unwell (no diagnosis)	132 (13 to 251)	1.22 (0.66 to 2.23)	2.30 (1.09 to 4.88)
ADU for APH (no admission)	53 (-56 to 163)	0.99 (0.56 to 1.74)	1.60 (0.87 to 2.92)
Sub-group vii: Placenta praevia			
Placenta praevia	1270 (410 to 2130)	7.74 (1.02 to 58.41)	4.86 (1.99 to 11.87)
Major placenta praevia	1931 (525 to 3336)	NA	3.67 (1.26 to 10.71)
Minor placenta praevia	477 (-41 to 996)	2.56 (0.30 to 21.59)	6.66 (1.25 to 35.39)
Anterior placenta praevia	2909 (1150 to 4669)	NA	12.30 (4.49 to 33.72)
Posterior placenta praevia	564 (61 to 1068)	4.81 (0.59 to 38.89)	2.41 (0.74 to 7.86)
Sub-group viii: APH and UTI			
APH	172 (15 to 329)	1.36 (0.78 to 2.37)	1.96 (1.15 to 3.34)
'Warning' APH	1145 (325 to 1965)	7.26 (0.96 to 55.16)	4.10 (1.65 to 10.20)
Urinary tract infection	20 (-41 to 80)	1.08 (0.73 to 1.60)	1.12 (0.69 to 1.82)
Sub-group ix: Pre-eclampsia and anaemia			
Gestational hypertension	131 (10 to 252)	2.28 (1.15 to 4.54)	0.74 (0.39 to 1.41)
Pre-eclampsia (all)	219 (113 to 326)	4.63 (1.79 to 11.96)	0.76 (0.39 to 1.50)
Pre-eclampsia <34/40	235 (17 to 452)	6.44 (0.81 to 51.41)	0.73 (0.21 to 2.51)
Pre-eclampsia ≥34/40	212 (92 to 333)	4.12 (1.41 to 11.98)	0.78 (0.35 to 1.72)
Anaemia <10.5 g/ml	40 (-20 to 101)	1.15 (0.83 to 1.60)	1.27 (0.84 to 1.92)
Anaemia <11.1 g/ml	5 (-39 to 50)	1.00 (0.79 to 1.28)	1.05 (0.74 to 1.48)
Polyhydramnios	75 (-178 to 328)	0.29 (0.03 to 2.90)	6.57 (0.41 to 105.69)
Sub-group x: Medications pre-birth (in the week before birth)			
Antibiotics	52 (5 to 98)	1.35 (1.02 to 1.80)	1.08 (0.76 to 1.53)
Antihypertensives (including for Pre-eclampsia)	105 (27 to 182)	1.76 (1.11 to 2.78)	0.79 (0.50 to 1.27)
Aspirin	129 (14 to 244)	1.50 (0.81 to 2.81)	1.02 (0.55 to 1.91)
Medication for diabetes	100 (-44 to 244)	2.62 (1.04 to 6.57)	0.91 (0.42 to 2.00)
Steroids for fetal reasons	106 (12 to 201)	1.17 (0.77 to 1.79)	2.06 (1.25 to 3.40)
Oral iron	23 (-25 to 70)	1.08 (0.82 to 1.44)	1.40 (0.99 to 2.00)
Steroids for maternal reasons	53 (-65 to 170)	1.17 (0.59 to 2.33)	1.67 (0.69 to 4.02)
Pain relief	154 (27 to 281)	1.62 (0.73 to 3.58)	1.38 (0.65 to 2.91)
Threatened preterm labour	246 (-220 to 712)	1.77 (0.59 to 5.31)	0.65 (0.21 to 2.04)
Thyroid disease	241 (-99 to 581)	1.55 (0.65 to 3.71)	2.04 (0.75 to 5.57)

Group C: Labour and birth			
Sub-group xi: Gestation at birth			
Gestational age at birth	0 (-9 to 9)	1.03 (0.98 to 1.09)	0.96 (0.91 to 1.02)
Sub-group xii: Birth weight			
Maximum birth weight (Kg)	50 (15 to 85)	1.50 (1.22 to 1.85)	1.06 (0.83 to 1.35)
Total birth weight (Kg)	69 (38 to 101)	1.55 (1.27 to 1.89)	1.16 (0.93 to 1.44)
Macrosomia >4 Kg	128 (55 to 201)	1.94 (1.33 to 2.82)	1.21 (0.76 to 1.95)
Macrosomia >4.5 Kg	156 (31 to 281)	2.96 (1.19 to 7.36)	0.81 (0.38 to 1.71)
Sub-group xiii: Onset of labour			
Spontaneous onset (reference group)			
Augmented	113 (14 to 211)	1.96 (1.19 to 3.24)	1.21 (0.57 to 2.58)
Induced	100 (50 to 150)	1.90 (1.39 to 2.60)	0.89 (0.60 to 1.33)
None (prelabour caesarean)	262 (202 to 323)	5.07 (3.41 to 7.53)	0.56 (0.38 to 0.84)
Duration of ROM (days)	65 (28 to 102)	1.54 (1.20 to 1.99)	0.93 (0.70 to 1.23)
Duration of ROM unrecorded	280 (219-341)	6.29 (4.28 to 9.54)	0.42 (0.25 to 0.68)
Prostin	54 (5 to 104)	1.43 (1.04 to 1.96)	0.98 (0.66 to 1.45)
Sub-group xiv: Intrapartum			
Syntocinon®	137 (92 to 183)	2.40 (1.84 to 3.14)	0.81 (0.58 to 1.14)
Duration of Syntocinon® (hours)	10 (0 to 19)	1.06 (1.00 to 1.13)	1.03 (0.98 to 1.08)
Spinal anaesthesia	181 (137 to 226)	4.10 (2.93 to 5.75)	0.37 (0.25 to 0.54)
Epidural analgesia	159 (117 to 202)	2.91 (2.22 to 3.81)	0.71 (0.52 to 0.97)
Temperature			
Temperature >37.2°C	190 (127 to 252)	2.65 (1.86 to 3.77)	0.92 (0.62 to 1.38)
Temperature >37.5°C	282 (169 to 396)	4.60 (2.34 to 9.06)	1.12 (0.64 to 1.95)
Temperature >37.8°C	413 (234 to 592)	7.94 (2.48 to 25.43)	1.31 (0.62 to 2.78)
Temperature >38.0°C	724 (368 to 1080)	132.72 (17.53 to 1004.68)	2.49 (0.92 to 6.69)
All temperature > 37.0°C	686 (412 to 960)	47.99 (7.16 to 321.46)	1.66 (0.71 to 3.89)
Temperature unrecorded	41 (-2 to 84)	1.28 (1.00 to 1.65)	0.73 (0.53 to 1.01)
Evidence of chorioamnionitis	796 (261 to 1330)	NA	4.65 (1.09 to 19.89)
Sub-group xv: Birth			
Mode of birth - SVD (reference group)			
Instrumental vaginal birth	194 (132 to 255)	3.84 (2.71 to 5.44)	0.45 (0.29 to 0.70)

Elective caesarean section	298 (238 to 358)	8.95 (5.80 to 13.79)	0.20 (0.13 to 0.33)
Emergency caesarean section	409 (357 to 461)	17.05 (11.47 to 25.34)	0.37 (0.25 to 0.55)
Sub-group xvi: Third stage			
Physiological third stage	-177 (-223 to -130)	0.47 (0.30 to 0.75)	3.18 (1.75 to 5.77)
Syntocinon® IM	18 (-71 to 106)	0.70 (0.44 to 1.11)	1.83 (0.83 to 4.02)
Syntocinon® IV (bolus)	317 (276 to 359)	8.56 (6.42 to 11.41)	0.44 (0.32 to 0.60)
Syntometrine® IM	-234 (-272 to -196)	0.19 (0.15 to 0.25)	1.63 (1.15 to 2.29)
Syntocinon® IV increased	36 (-23 to 94)	1.10 (0.71 to 1.69)	0.71 (0.42 to 1.18)
Syntocinon® 40/50 IU infusion commenced	272 (232 to 313)	6.07 (4.64 to 7.92)	0.46 (0.34 to 0.63)
Retained placenta	374 (154 to 594)	3.49 (1.55 to 7.82)	1.76 (1.01 to 3.06)
Interval to suturing (hours)	113 (14 to 212)	0.97 (0.81 to 1.16)	1.44 (1.21 to 1.72)
Interval to suturing unknown	65 (-3 to 133)	1.69 (1.05 to 2.72)	0.56 (0.32 to 0.95)

Key: For continuous measures (e.g. age, BMI) the change is given for each additional 10 years of age or 1kg/m² of BMI. For variables with more than 2 categories (e.g. ethnicity) a reference group is declared (White), and comparisons are made to this. *IMD; Index of multiple deprivation & two of seven subscales based on area of residence, England and Wales shown. Methods S1 for full list. NA; Not applicable, all women had EBL_≥500ml. #; numbers too small.

Summary of significant factors:

(a) Pre-pregnancy

Before adjusting for potential confounders, significant pre-pregnancy predictors for PPH were age, Black African ethnicity, index of multiple deprivation (barriers to housing & services), assisted conception and previous caesarean, with index of multiple deprivation (education, skills and training) and multiparity being protective. Significant risk factors for progression to severe PPH were index of multiple deprivation (education, skills and training), BMI, previous PPH and parity (=2), with smoking being protective.

(b) During pregnancy

Predictors of PPH before adjustment included multiple pregnancy, antenatal day unit attendance, antenatal admission, placenta praevia, gestational hypertension, pre- eclampsia screen and diagnosis, use of antibiotics, antihypertensives and diabetes medication. Predictors of progression to severe PPH acquired during pregnancy were antenatal day attendance with 'generally unwell (no diagnosis)', placenta praevia (major, minor and anterior), APH, 'warning' APH and steroids for fetal reasons.

(c) Labour and birth

Labour and birth predictors of PPH included birthweight (Kg) and macrosomia, no labour onset, induction, augmentation, duration of ruptured membranes, use of Prostin and Syntocinon®, regional analgesia and anaesthesia, temperature >37.0°C, instrumental delivery, caesarean (elective and emergency), third stage Syntocinon® IV bolus or infusion and retained placenta. Unrecorded temperature, duration of ruptured membranes and interval to suturing were all predictors of PPH. Both physiological third stage management and Syntometrine® IM were protective. Intrapartum predictors of progression to severe PPH were evidence of chorioamnionitis, physiological third stage management, Syntometrine® IM, retained placenta and interval

to suturing. Protective factors included no labour onset, regional analgesia and anaesthesia, instrumental delivery, caesarean (elective and emergency) and third stage Syntocinon® IV bolus and infusion. Unrecorded duration of ruptured membranes or interval to suturing appeared protective