ISSUES

- bleeding in pregnant population ≠ bleeding in trauma patient
- PT/APTT can remain normal despite large bleed
- fibrinogen levels fall earlier than other factors
- aetiology of bleeding affects the onset of coagulopathy
- limited info on haemostatic changes during evolving PPH

Table 1 Mechanisms of coagulopathy dependent on aetiology of obstetric bleed. Late onset is abnormal coagulation usually only after 2000 ml blood loss.

Aetiology of bleed	Likelihood of coagulopathy (% transfused FFP)	Time of onset of coagulopathy	Mechanism of coagulopathy		
				Consumptive	
			Dilution	Local to uterus and placenta	Disseminated intravascular
Uterine atony	14	Late	Contributes in severe cases	Contributes in severe case	Very rare
Genital tract or surgical trauma	4	Late	Contributes in severe cases	Contributes in severe cases	Very rare
Placental abruption	42	Early (often before blood loss observed)	Contributes in severe cases	Main cause in mild and moderate cases	Contributes in severe cases
Retained and adherent placenta	8	Early or late	Contributes in most cases	Contributes in some cases	Rare unless associated with infection
Uterine rupture	66	Early	Main cause because large bleeds are common	Contributes in some cases	–
AFE	100	Early	Contributes in large bleeds	–	Main cause
Pre-eclampsia/HELLP	ND	Early (often before labour)	Contributes in large bleeds	Contributes in some cases	Contributes in some cases

AFE, amniotic fluid embolus; HELLP, haemolysis, elevated liver enzymes and low platelets.

ROLE OF FIBRINOGEN

- strong evidence that low fibrinogen (<2g/L) is accurate biomarker for progression from moderate to severe PPH

Table 2 Clauss fibrinogen as a biomarker for predicting progression of postpartum haemorrhage (PPH). Values are median (IQR) or mean (SD).

Reference	Number studied	Entry criteria	Definition of progression	Fibrinogen level; $g.l^{-1}$	
				Non-progression	Progression
Charbit et al. [25]	128	Second line uterotonic after manual evacuation	Fall in Hb > 40 $g.l^{-1}$, ≥ 4 units RBC, need for invasive procedure*	4.4 (3.7–5.1)	3.3 (2.5–4.2)
Cortet et al. [35]	738	Vaginal delivery > 500 ml PPH Excluding genital tract trauma, uterine rupture, accreta and praevia	Fall in Hb > 40 $g.l^{-1}$, any red cell transfusion, need for invasive procedure, admission to ICU	4.2 (1.2)	3.4 (0.9)
Gayat et al. [37]	257	Admission to referral centre for PPH†	Need for an invasive procedure	2.65 (2.08–3.46)†	1.8 (1.09–2.52)†
De Lloyd et al. [36]	240	Any cause of PPH and time of first coagulation test	Need for ≥ 4 units red cells or PPH > 2500 ml	4.4 (1.1)	3.1 (1.0)
Collins et al. [27]	346	Any cause of PPH 1000–1500 ml	Need for ≥ 4 units red cells or PPH > 2500 ml	3.9 (3.2–4.5)	2.8 (2.1–3.8)

*Most defined as progressing based on fall of Hb > 40 $g.l^{-1}$.
†Fibrinogen was taken on average 4 h after the onset of bleeding on admission to a referral centre and this contributes to the lower fibrinogen levels in this cohort.