Transfusion management and haemostatic changes in major obstetric haemorrhage in the UK

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Background

- Obstetric haemorrhage remains an important cause of maternal mortality and morbidity

- Blood transfusion is fundamental to improving outcomes

- The availability of new rapid diagnostic tests and the introduction of new haemostatic resuscitation strategies have challenged thinking on optimal transfusion support for patients with massive haemorrhage.
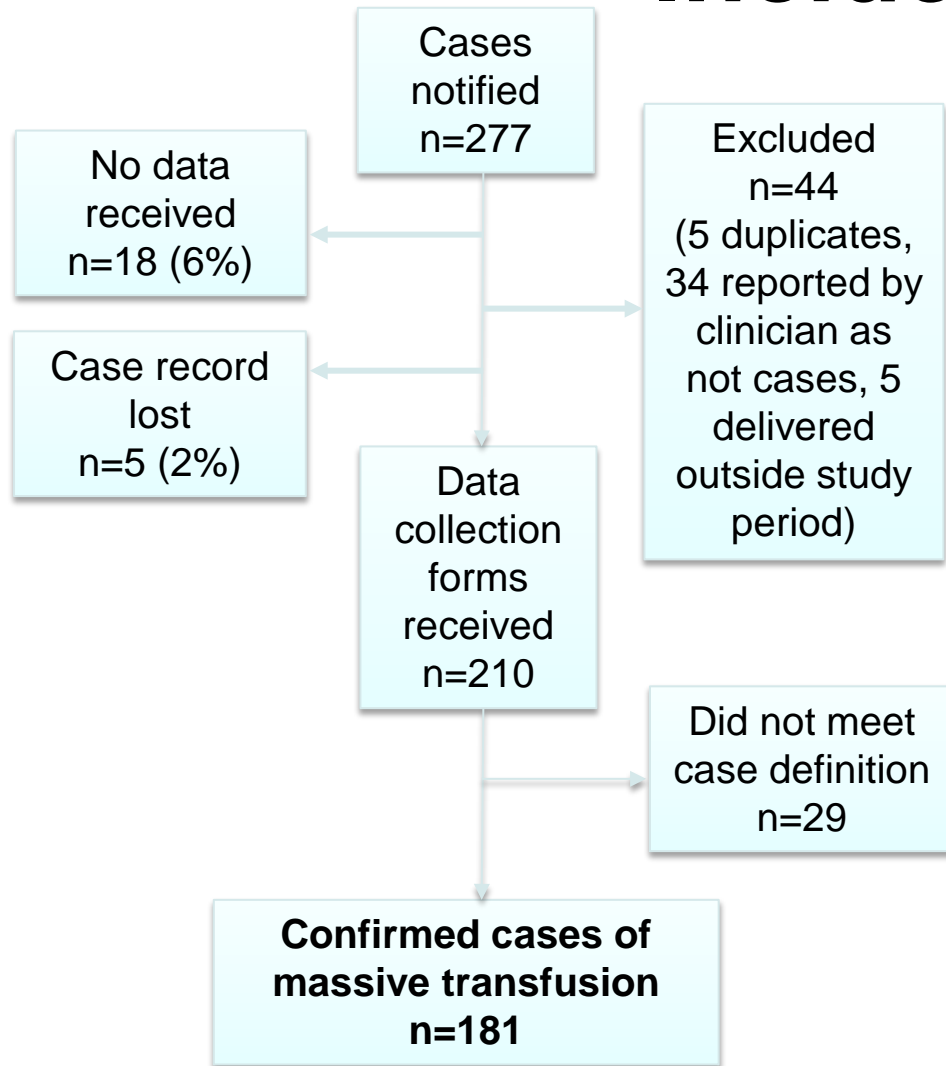
Aims

- To estimate the incidence of massive transfusion following obstetric haemorrhage in the UK

- To describe the characteristics of women undergoing massive transfusion following obstetric haemorrhage

- To characterise their haemostatic abnormalities and transfusion management

Methods

- National population-based descriptive study

- **Case definition**: Any pregnant woman of 20 weeks gestation or more identified as having ≥8 units of RBC transfusion within a 24 hour period

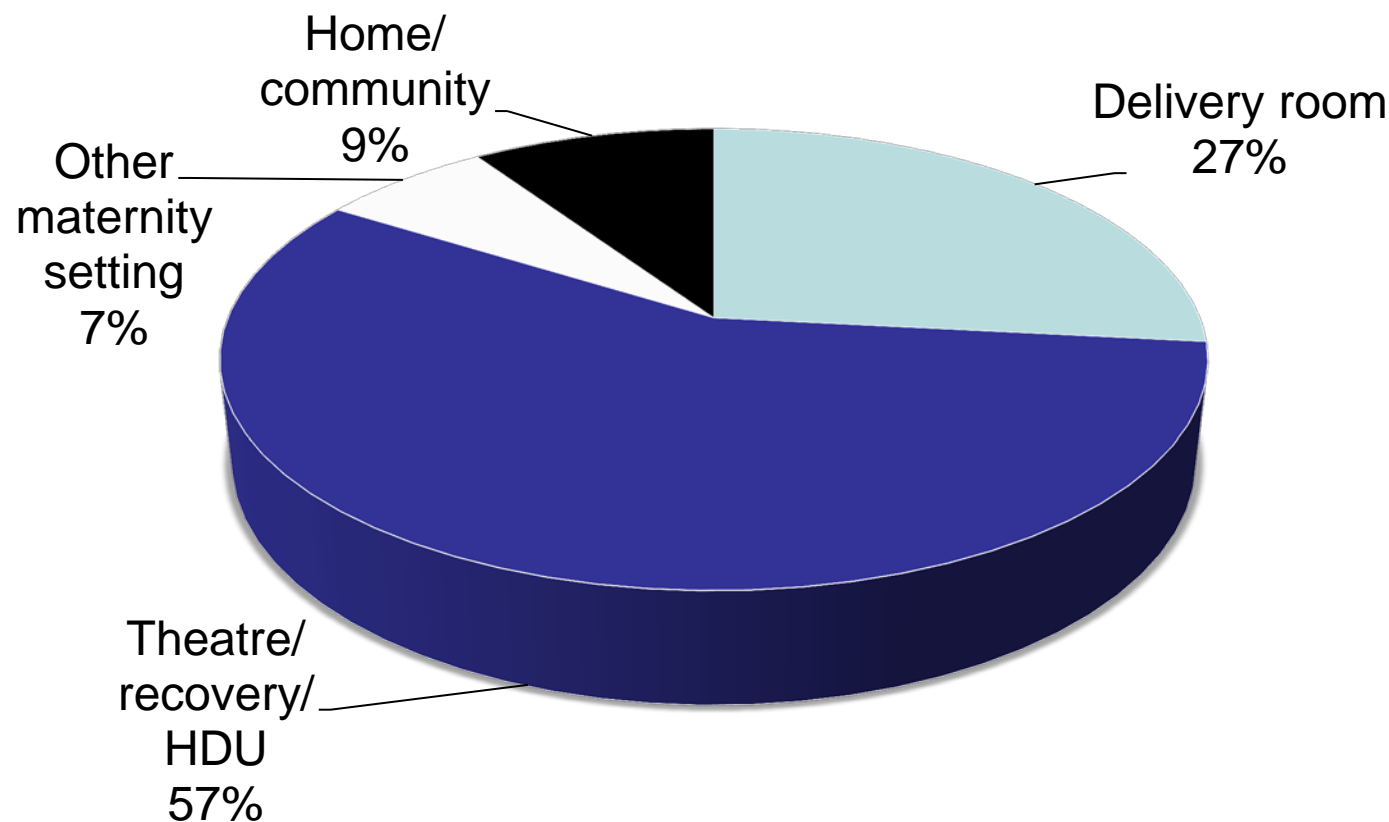- Cases identified using UKOSS between July 2012 and June 2013

Incidence

Cases notified n=277

No data received n=18 (6%)

Case record lost n=5 (2%)

Excluded n=44 (5 duplicates, 34 reported by clinician as not cases, 5 delivered outside study period)

Data collection forms received n=210

Did not meet case definition n=29

Confirmed cases of massive transfusion n=181

Estimated incidence

2.3 per 10,000 maternities

(95% CI 1.9 to 2.6)

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Women's characteristics

Characteristic	Median	IQR	N (%)
Age (years)	33	29-36	
BMI	25.1	22.2-29.3	
Primiparous			68 (38%)
Previous caesarean section			73 (40%)
Previous post-partum haemorrhage			25 (14%)
Multiple pregnancy			8 (4%)
Induction of labour			61 (34%)
Caesarean delivery			123 (69%)
Grade of urgency for CS			
– Category 1			47 (38%)
– Category 2			40 (33%)
– Category 3			11 (9%)
– Category 4			24 (20%)
Haemoglobin prior to delivery (g/L)	114	105-125	

Location at onset of haemorrhage

Home/community 9%

Other maternity setting 7%

Delivery room 27%

Theatre/recovery/HDU 57%

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Haemorrhage volume
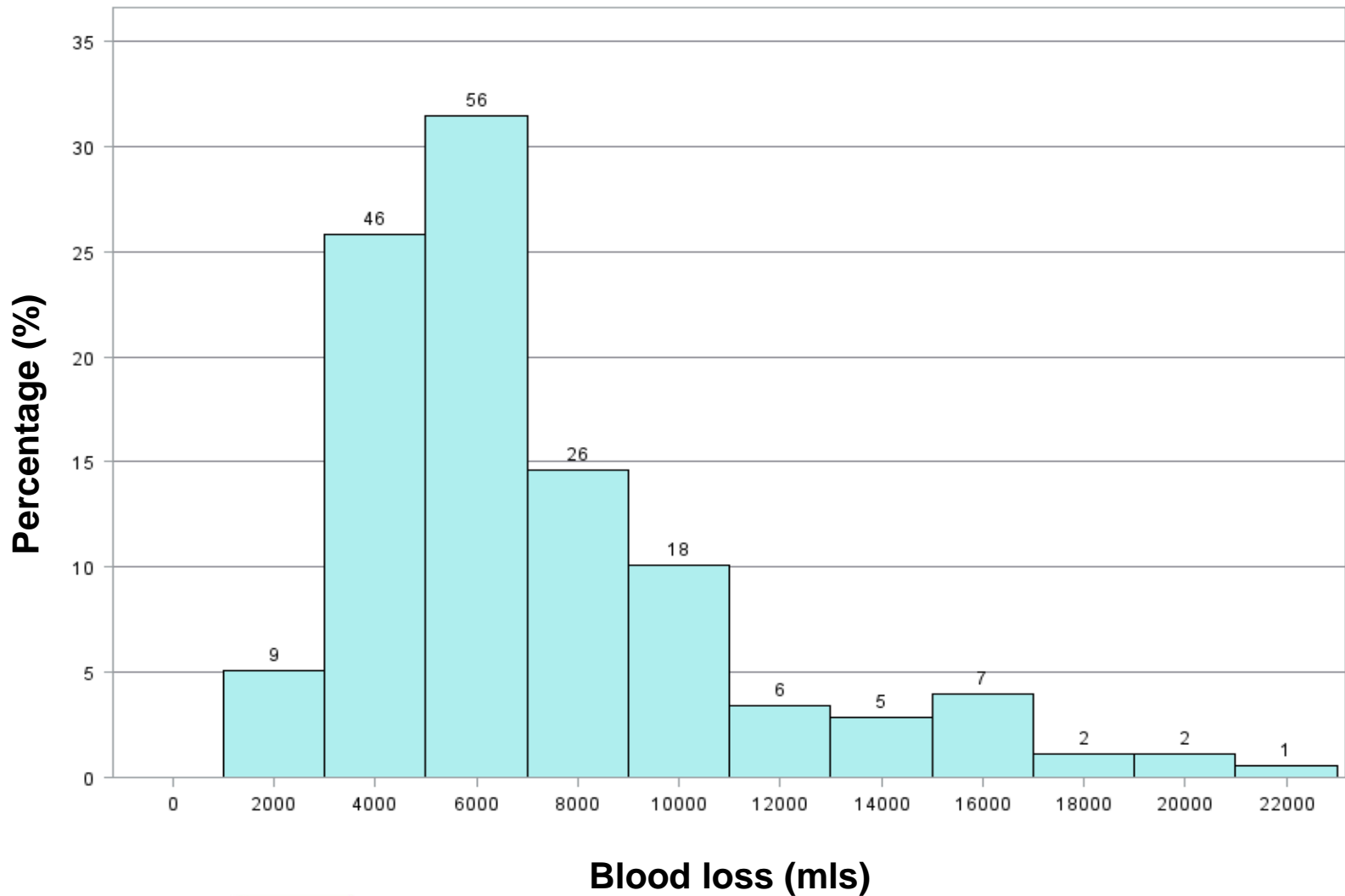
Causes of haemorrhage

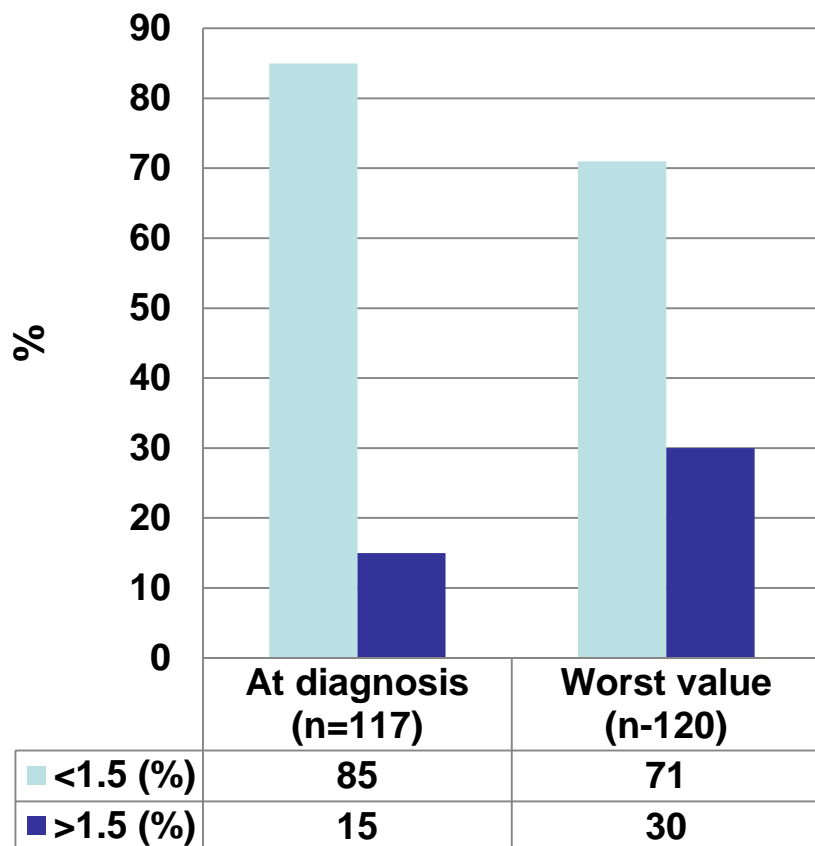| Cause of haemorrhage	N (%)
Uterine atony	71 (40%)
Placenta praevia	13 (7%)
Placenta accreta/increta/percreta	29 (16%)
Placental abruption	17 (9%)
Uterine rupture	8 (4%)
Surgical/genital tract trauma/tears	26 (14%)
Others	17 (10%)

Haematological parameters

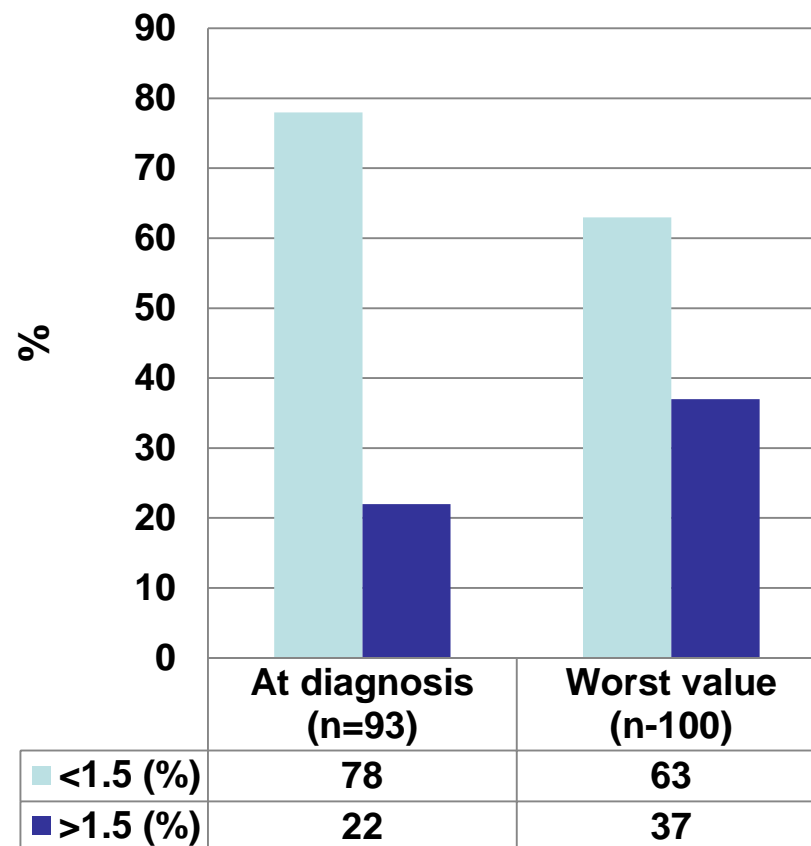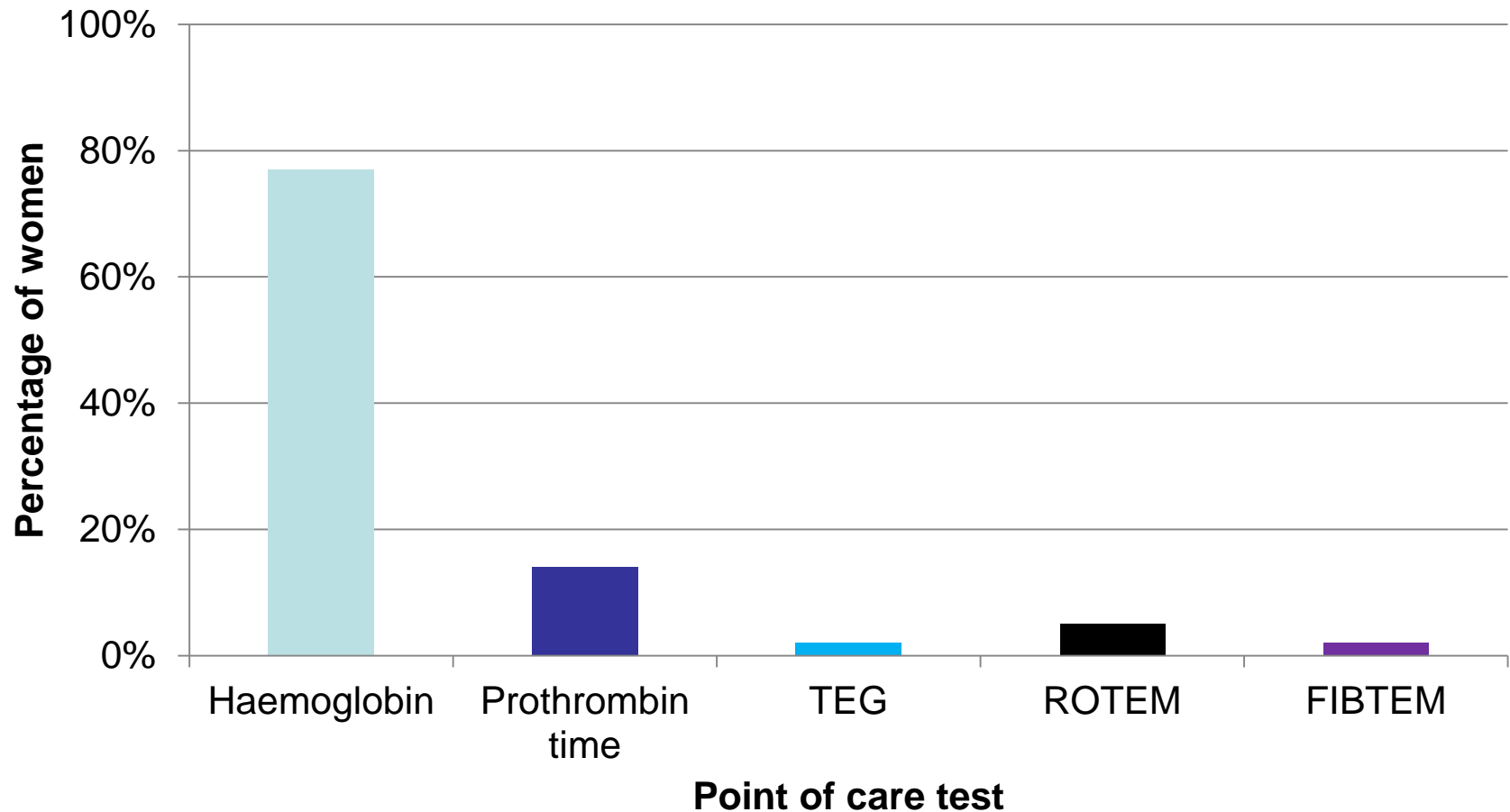| Parameter		Median	IQR
Hb (g/L)	at diagnosis (worst value)	88 (69)	70-103 (59-76)
Platelet count (x10^9/L)	at diagnosis (worst value)	131 (68)	97-199 (50-95)
INR	at diagnosis (worst value)	1.1 (1.3)	1.0-1.3 (1.1-1.5)
APTT (ratio)	at diagnosis (worst value)	1.1 (1.3)	1.0-1.4 (1.1-1.9)
Fibrinogen (g/dL)	at diagnosis (worst value)	1.8 (1.4)	1.2-2.8 (0.8-2.2)

Fibrinogen levels

	At diagnosis (n=141)	Worst value (n=149)
<2 g/dL	50	68
>2 g/dL	50	32

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INR

	At diagnosis (n=117)	Worst value (n-120)
<1.5 (%)	85	71
>1.5 (%)	15	30

APTT

	At diagnosis (n=93)	Worst value (n-100)
<1.5 (%)	78	63
>1.5 (%)	22	37
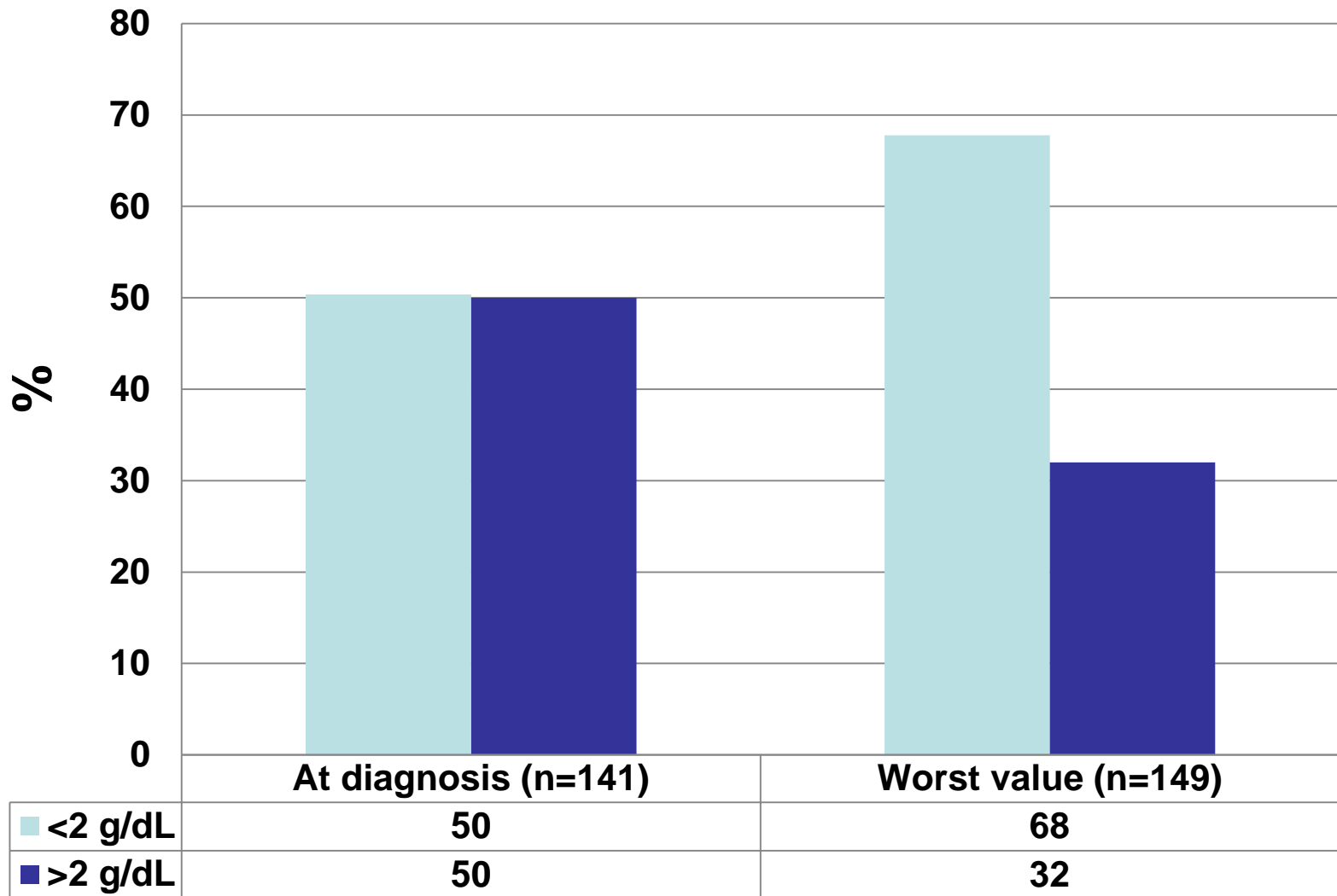
Point of care testing

Transfusion management - 1

Product used	Median	IQR	N (%)
Red Blood Cells (RBC) units)	10	8-14	181 (100%)
Fresh Frozen Plasma (FFP) (units)	6	4-8	180 (99%)
Platelets (pools)	2	1-3	140 (77%)
Cryoprecipitate (pools)	2	2-4	111 (61%)
Crystalloid (mL)	3000	2000-4000	164 (91%)
Colloid (mL)	1500	1000-2000	141 (78%)
Cell salvage (mL)	835	400-1560	28 (15%)

Transfusion management - 2

	Median	IQR	N (%)
Time from haemorrhage diagnosis to first unit RBC (minutes)	42	20-85	
Units of RBC transfused before 1st FFP	4	3-6	
Units of RBC transfused before 1st cryoprecipitate	7	6-9	
Ratio of FFP to RBC	0.5	0.4-0.7	
Use of Recombinant Factor VIIa			12 (7%)
Use of Fibrinogen concentrate			10 (6%)
Use of Tranexamic acid			84 (46%)

Outcomes

Outcome	Number of women (%)
Maternal death	2 (1%)
Hysterectomy	81 (45%)
ITU/Level 3 critical care admission	149 (82%)
Major maternal morbidity	51 (28%)
Pregnancy loss	5/181 (3%)
Perinatal death	17/175 (10%)

Guidelines

- RCOG guidance recommends:

  o FFP when INR/APTTr >1.5 or if ≥ 6 units of RBC transfused

  o Cryoprecipitate when Fg <1.0g/dL

  o Platelets if platelet count <50 x10^9/L (<75 x10^9/L margin of safety)

Guidelines

- RCOG guidance recommends FFP if:
  - APTT ratio or INR >1.5 (33% of cases)
  - Fibrinogen <1.0g/dL (27% of cases)
  - 6 or more units of RBC transfused (100%)

- Platelets if:
  - Platelets <50 x10^9/L (25% of cases)
    (<75 x10^9/L margin of safety)

Summary

- The main causes of obstetric haemorrhage requiring massive transfusion are uterine atony and placental implantation abnormalities

- A significant proportion of haemorrhages began at home

- The first measured fibrinogen was low, whereas APTT/PT ratios were preserved

- Guideline criteria for plasma/platelet transfusion were fulfilled in ~ 30% of these severe cases

- Hysterectomy rates were high, but case fatality low

Acknowledgements

- UKOSS reporting clinicians