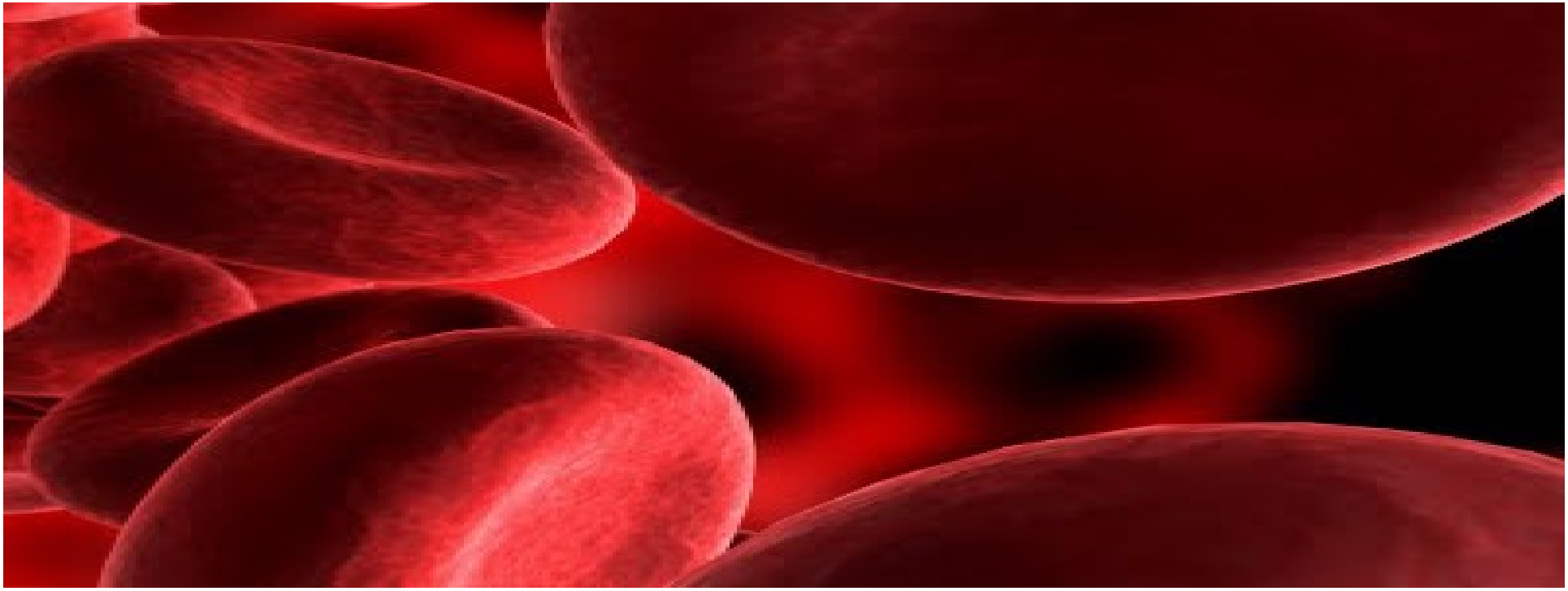
Massive Obstetric Haemorrhage

Jim Bamber

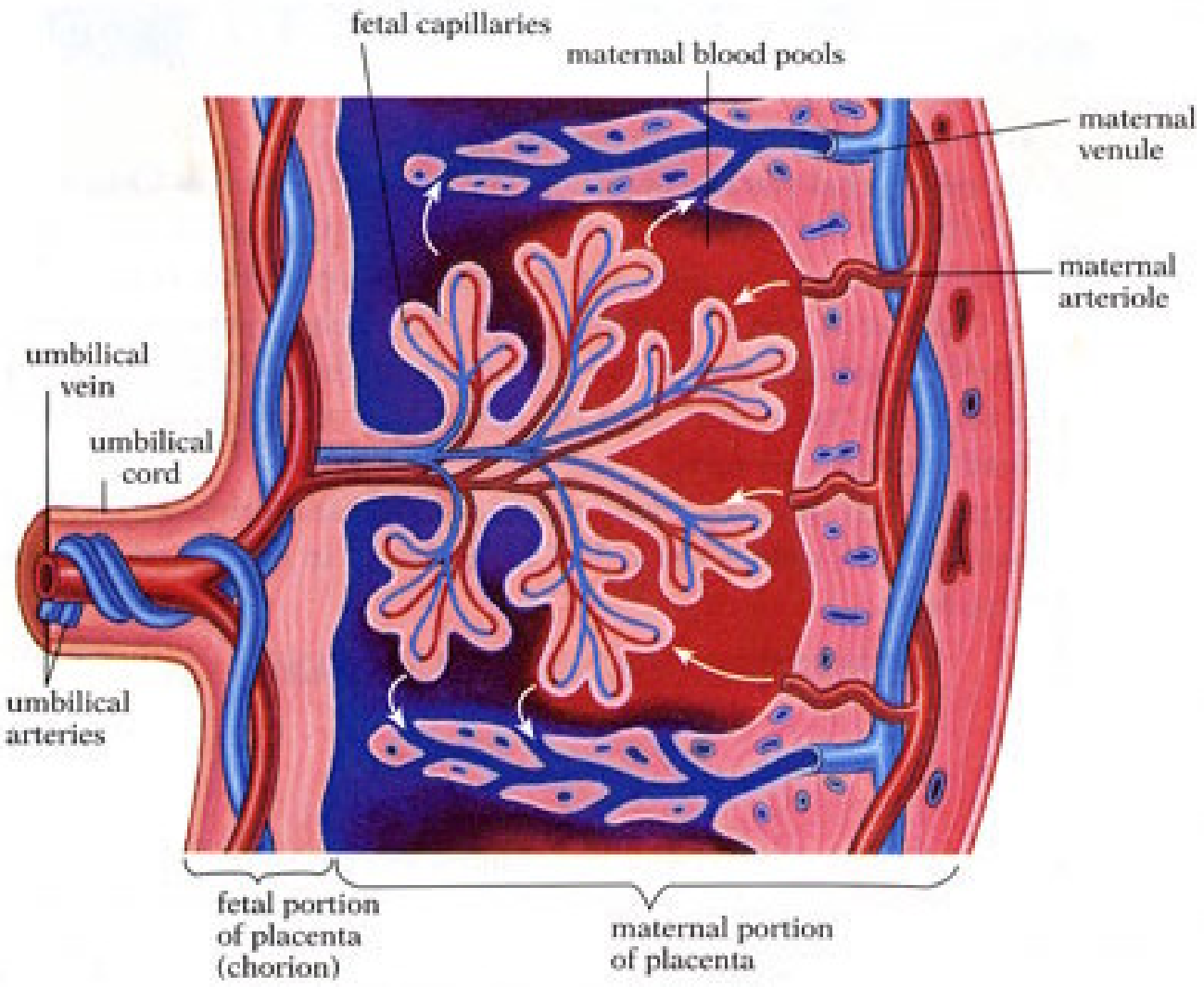


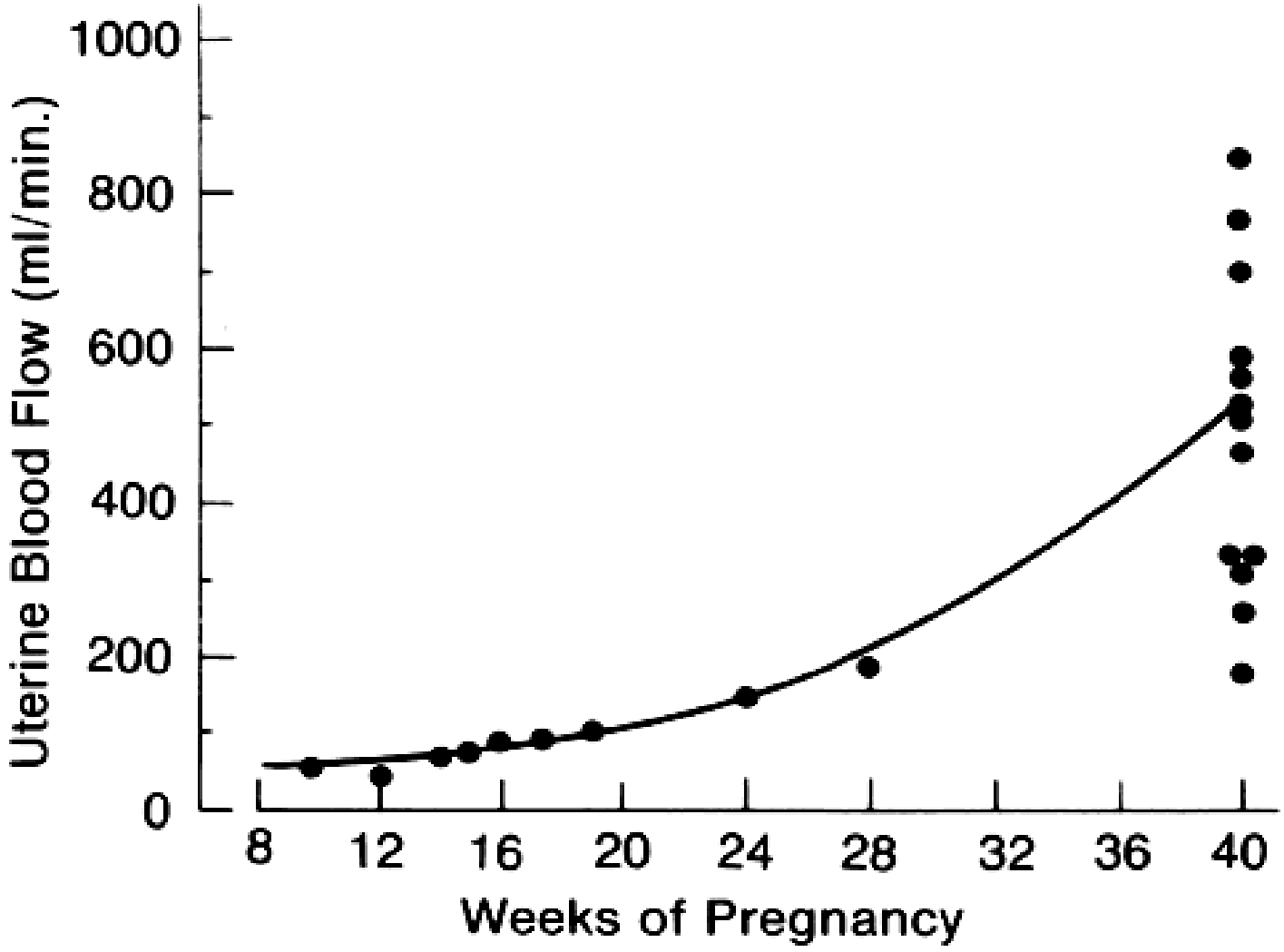
Overview

- What is massive obstetric haemorrhage?
- How common is it and why is it important?
- What are the main causes?
- How well do we recognise it?
- Management
- Team work

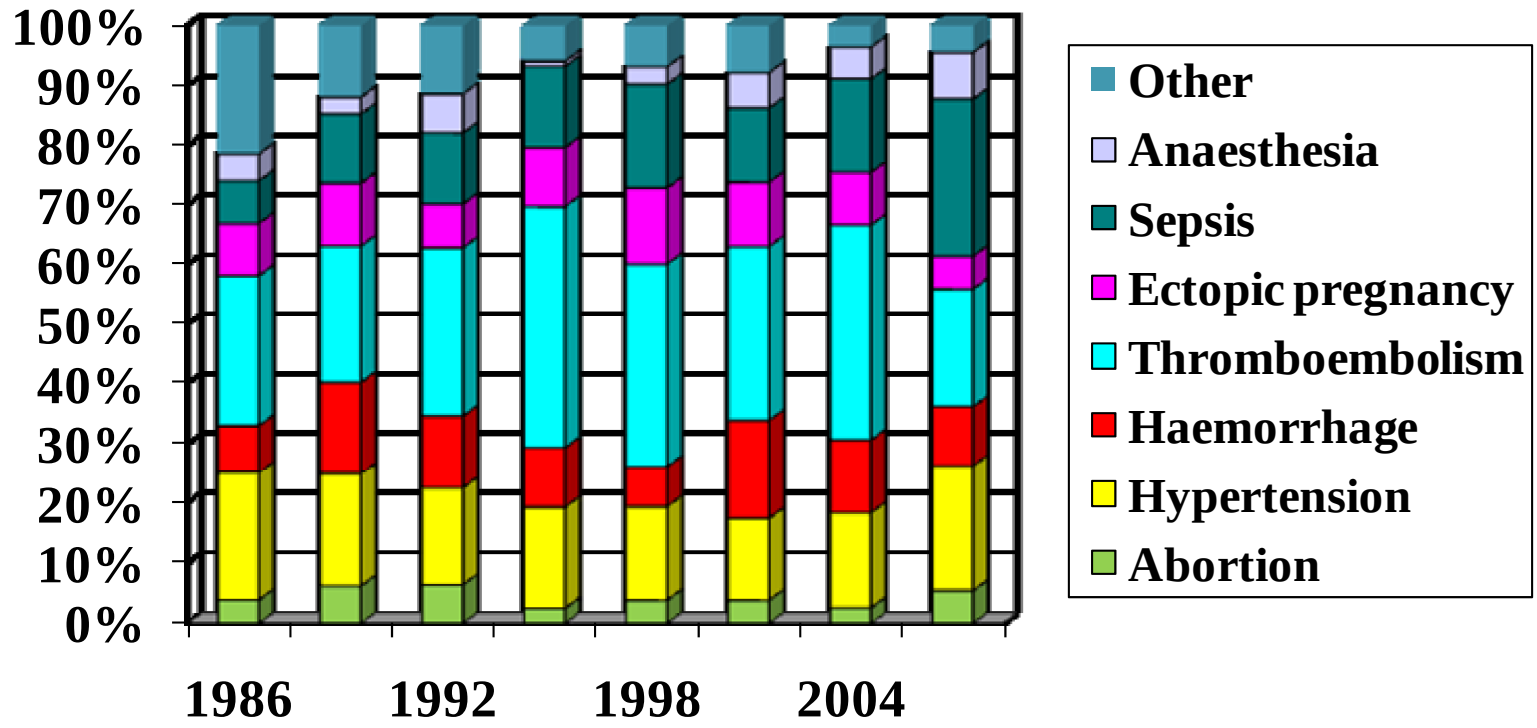
Massive haemorrhage

- Loss of one Blood Volume in 24hr
- Loss of 50% Blood Volume in 3 hrs
- Blood loss at rate of 150ml per minute


fetal capillaries
maternal blood pools
maternal venule
maternal arteriole
umbilical vein
umbilical cord
umbilical arteries
fetal portion of placenta (chorion)
maternal portion of placenta


Uterine Blood Flow (ml/min.)
1000
800
600
400
200
0
8
12
16
20
24
28
32
36
40
Weeks of Pregnancy

Principal Causes of Direct Maternal Death in UK 1985 - 2008



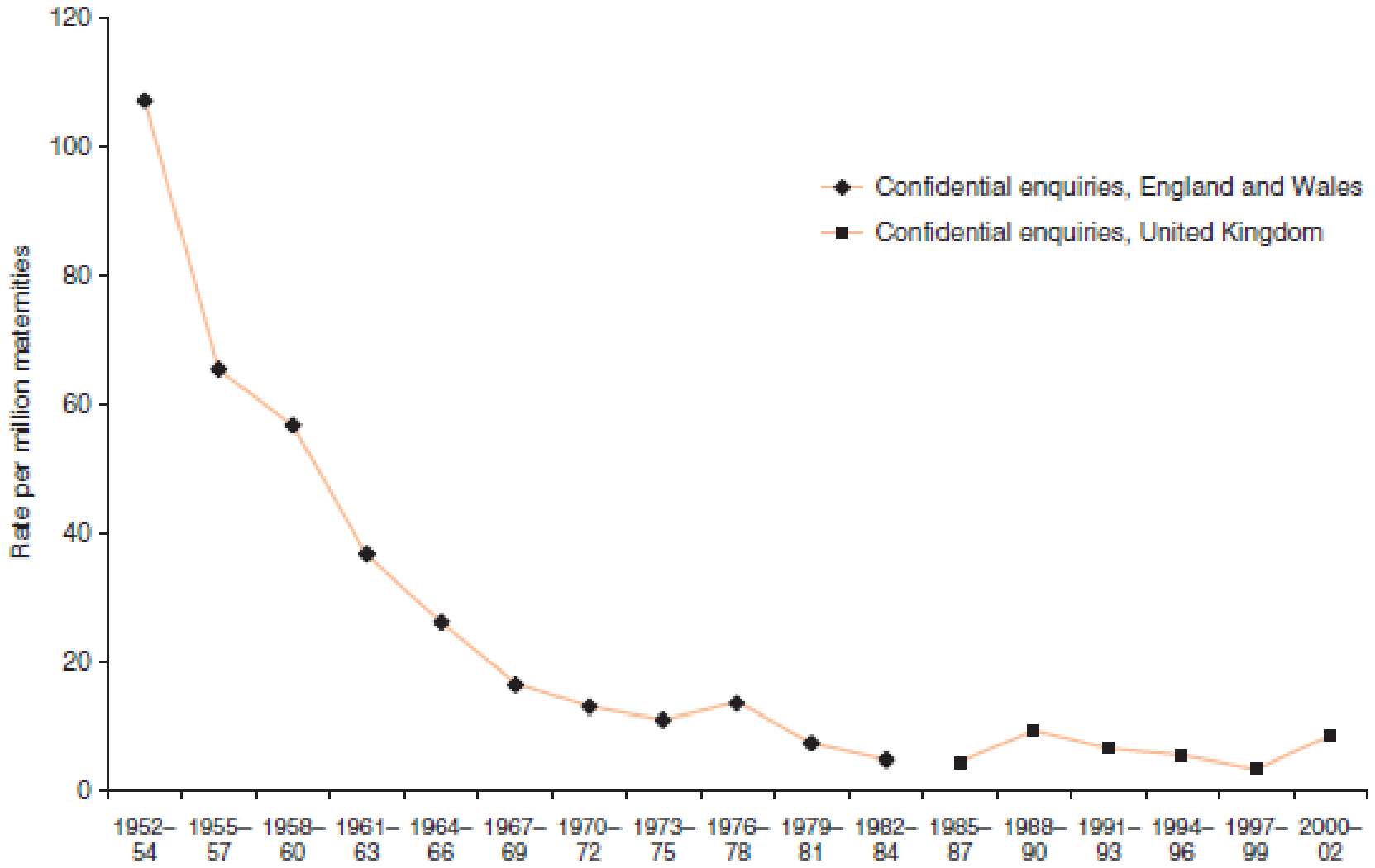


Figure 4.1 Maternal mortality for deaths due to haemorrhage; England and Wales 1952–84; United Kingdom 1984–2002

Table 4.1. *Direct* deaths by type of obstetric haemorrhage or genital tract trauma and mortality rate per 100 000 maternities; UK: 1985–2008

	Cause of haemorrhage										
	Placental abruption	Placenta praevia	Postpartum haemorrhage	Total			Genital tract trauma*			Overall total	Overall
Triennium	*n*	*n*	*n*	*n*	Rate	95% CI	*n*	Rate	95% CI	*n*	rate
1985–87	4	0	6	10	0·44	0·24–0·81	6	0·26	0·12–0·59	16	0·71
1985–87	6	5	11	22	0·93	0·62–1·41	3	0·13	0·04–0·39	25	1·06
1991–93	3	4	8	15	0·65	0·39–1·07	4	0·17	0·06–0·46	19	0·82
1994–96	4	3	5	12	0·55	0·31–0·95	5	0·23	0·09–0·55	17	0·77
1997–99	3	3	1	7	0·33	0·16–0·68	2	0·09	0·02–0·38	9	0·42
2000–02	3	4	10	17	0·85	0·53–1·36	1	0·05	0·01–0·36	18	0·90
2003–05	2	3	9	14	0·66	0·39–1·11	3	0·14	0·05–0·44	17	0·80
2006–08	2**	2***	5	9	0·39	0·20–0·75	0****	0·00		9	0·39

*Includes ruptured uterus. These deaths were discussed in a separate Chapter in previous reports.

**Includes one very late ectopic pregnancy in the third trimester.

***Including one woman with placenta praevia/accreta and ruptured uterus.

****Genital tract tears were implicated in two women who died of postpartum haemorrhage.

Table 4.1. *Direct* deaths by type of obstetric haemorrhage or genital tract trauma and mortality rate per 100 000 maternities; UK: 1985–2008

Amongst the deaths, the lack of early senior multidisciplinary involvement, the lack of close postoperative monitoring and the failure to act on signs and symptoms that a woman is seriously unwell, including readings from MEOWS charts, remain important contributors to maternal death from haemorrhage. All clinicians involved in the care of pregnant women could further reduce the risk of haemorrhage-related maternal death by improvements in these elementary aspects of care.

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HOSPITAL EPISODE STATISTICS

NHS
The Information Centre
for health and social care

2008 - 2009

Diagnosis	Number	% all deliveries
Placental disorders	6,338	1.0%
Placenta praevia	3,985	0.6%
Premature separation of placenta (abruption)	2,422	0.4%
Antepartum haemorrhage (not elsewhere classified)	7,190	1.1%
Postpartum haemorrhage	66,012	10.1%

PPH: Causes

- Tone – Atony 70%
- Trauma – Genital tract, inversion 20%
- Tissue – Retained or invasive placenta 9%
- Thrombin – Coagulopathy 1%

Anderson J, Etches D, Smith D. Postpartum haemorrhage. In Damos JR, Eisinger SH, eds. *Advanced Life Support in Obstetrics (ALSO) provider course manual.* Kansas: American Academy of Family Physicians, 2000:1–15

Table 1. Causes of haemorrhage in women undergoing peripartum hysterectomy

Cause	Number of women (%) (*n* = 315)*
Uterine atony	167 (53)
Placenta accreta/increta/percreta	121 (38)
Uterine rupture	26 (8)
Extension of uterine incision at delivery	20 (6)
Uterine infection	16 (5)
Fibroids	11 (3)
Genital tract laceration	11 (3)
Extension of previous uterine scar at delivery	10 (3)
Other**	43 (14)

*Includes 100 women (32%) with two or more reported causes of haemorrhage, thus the total exceeds 100%.
**Including placenta praevia, clotting abnormality and placental abruption.

Please cite this paper as: Knight M on behalf of UKOSS. Peripartum hysterectomy in the UK: management and outcomes of the associated haemorrhage. BJOG 2007;114:1380–1387.

Causes

- Most are post partum
- Most post partum haemorrhages are due to an atonic uterus

Table 1 Risk Factors for Uterine Atony

Factors associated with uterine overdistension
- Multiple pregnancy
- Polyhydramnios
- Fetal macrosomia

Labor-related factors
- Induction of labor
- Prolonged labor
- Precipitate labor
- Oxytocin augmentation
- Manual removal of placenta

Use of uterine relaxants
- Deep anesthesia (especially halogenated anesthetic agents)
- Magnesium sulfate

Intrinsic factors
- Previous postpartum hemorrhage
- Antepartum hemorrhage (placental abruption or previa)
- Obesity
- Age > 35 years

Adapted from Breathnach F, Geary M: in A Textbook on Postpartum Hemorrhage. B-Lynch C, Louis K (eds): Sapiens Publishing, 2004.

How well do we recognise haemorrhage?

> “Midwives and doctors underestimate blood loss at delivery by 30 – 50%”

Glover P. Blood loss at delivery: how accurate is your estimation? *Aust J Midwifery* 2003;16:21–4

Blood loss	Prevalence (%)	
	Visual estimate	Direct measurement
>500mls	5.7	27.6
>1000mls	0.4	3.5

Prasertcharoensuk W, Swadpanich U, Lumbiganon P. Accuracy of the blood loss estimation in the third stage of labor. *Int J Gynaecol Obstet* 2000;71:69–70

Management of Massive Obstetric Haemorrhage

- Be prepared
- Diagnose and declare
- Instigate immediate management
- 4 key simultaneous components
  - Communication
  - Resuscitation
  - Monitoring
  - Treatment

Be Prepared

Does your unit have:

- A major haemorrhage trolley?
- A major haemorrhage protocol?
- Immediate access to O neg blood?
- Obstetric emergency drills?

Have you risk assessed your patient ?

Cambridge University Hospitals NHS
NHS Foundation Trust

Massive Blood Loss in Adults

4 litres in 24 hours 2 litres in 3 hours > 150ml/min

Get help

Contact senior member of clinical team. Contact senior ward nurses
Contact portering services

Contact Transfusion **ext 58405**

Ask Transfusion to **'initiate major blood loss protocol'**

Assess ABC

IV access

2 large cannula

Send blood samples, cross-match, FBC, coagulation, biochemistry
Consider arterial blood gas measurement

Send FBC and coagulation samples after every 5 units of blood given

Resuscitate

IV warm fluids – crystalloid or colloid

Give Oxygen

Give blood

Blood loss >40% blood volume is immediately life-threatening

Give 4 units via fluid warmer. Aim for Hb>8g/dl

Give Group O Rh D negative if immediate need
and/or blood group unknown

Blood Transfusion lab will provide group specific/cross-matched red cells as required

Before Tranfusion
- Check Patient ID
- Use wristbands
- PBARS

Blood loss >40% Blood volume
- 1500–2000mls loss
- Pulse > 120, RR > 30
- Hypotensive
- Urine < 20mls/h

Prevent coagulopathy

Anticipate need for platelets and FFP after 4 units blood replacement and continuing bleeding

Give Primary Major Haemorrhage (MH) Pack

Order Secondary Major Haemorrhage (MH) Pack

Correct hypothermia

Correct hypocalcaemia (keep ionised Ca > 1.13mmol/L)

Contact Haematologist

Primary MH Pack
- Blood 5 units
- FFP 4 units

Secondary MH Pack
- Blood 5 units
- FFP 4 units
- Platelets
- Cryoprecipitate

Reassess and document

Get help to stop bleeding

Contact surgeons, gastroenterologists, obstetricians as appropriate

v1 02/10

How to recognise massive obstetric haemorrhage

Table 1

Classification of hemorrhage

	Class			
Parameter	I	II	III	IV
Blood loss (ml)	<750	750–1500	1500–2000	>2000
Blood loss (%)	<15%	15–30%	30–40%	>40%
Pulse rate (beats/min)	<100	>100	>120	>140
Blood pressure	Normal	Decreased	Decreased	Decreased
Respiratory rate (breaths/min)	14–20	20–30	30–40	>35
Urine output (ml/hour)	>30	20–30	5–15	Negligible
CNS symptoms	Normal	Anxious	Confused	Lethargic

Modified from Committee on Trauma [4]. CNS = central nervous system.

How to recognise massive obstetric haemorrhage

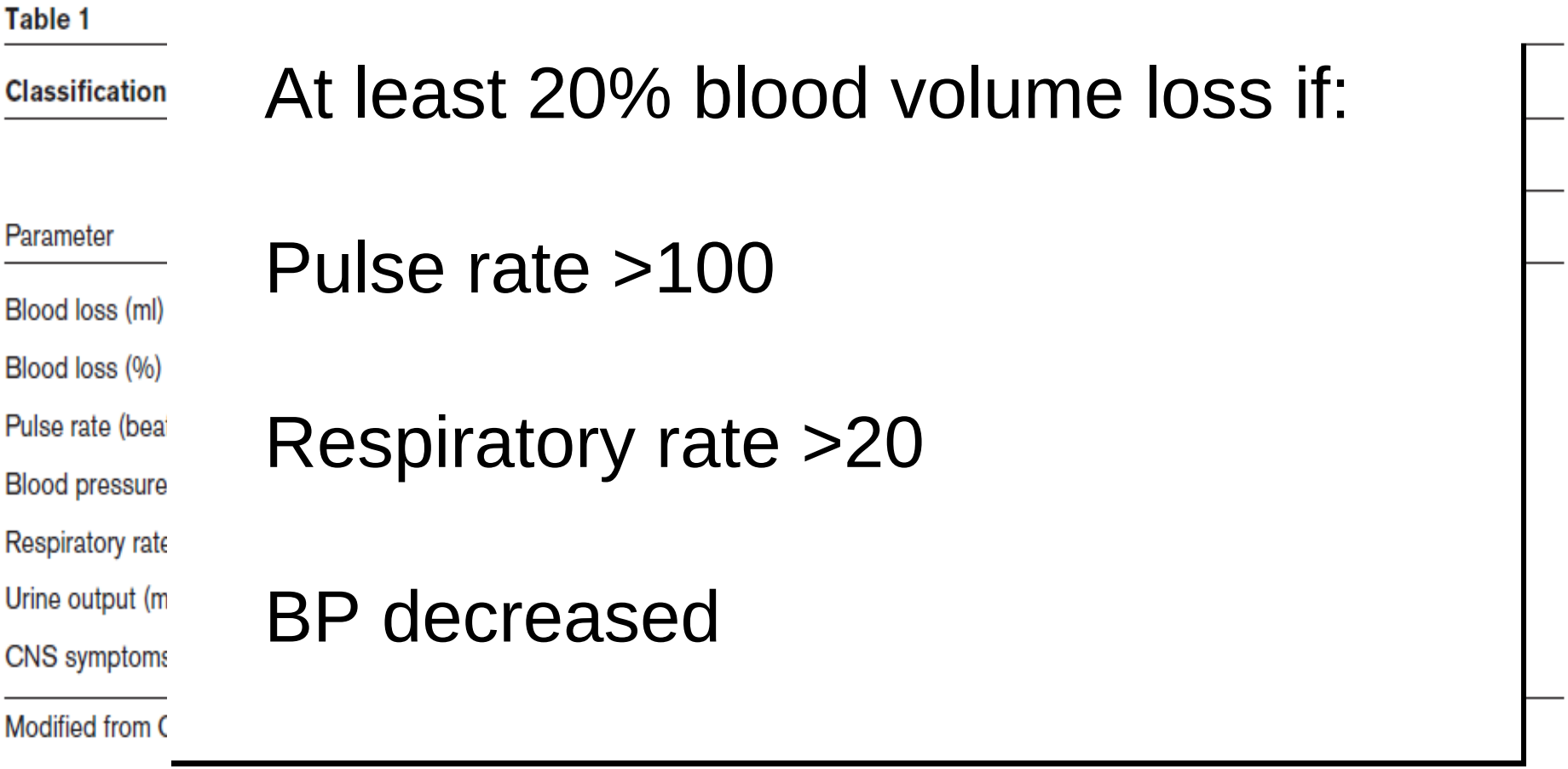


Table 1

Classification

Parameter

Blood loss (ml)

Blood loss (%)

Pulse rate (bea

Blood pressure

Respiratory rate

Urine output (m

CNS symptoms

Modified from C

At least 20% blood volume loss if:

Pulse rate >100

Respiratory rate >20

BP decreased

How to recognise massive obstetric haemorrhage

- Capillary refill
- Respiratory rate
- Pulse rate
- Urine output
- Blood pressure

Communication

- Get Help
- Patient and partner
- Senior midwife, obstetrician and anaesthetist
- Blood transfusion and duty haematologist
- Theatre Team
- Portering services
- Delegate record keeping

Resuscitation

- ABC
- Oxygen
- Major Haemorrhage Trolley
- IV access and blood samples
- Near-patient testing
- IV fluids
- O Neg Blood

Fluid replacement

How much blood can you afford to lose?

- Blood is vital for oxygen delivery to organ cells
- Organ cell damage occurs with 50% blood volume loss if NO fluid replacement
- Organ cell damage does not occur until 100% blood volume loss if given equivalent fluid replacement

GIVING JUST FLUID CAN SAVE A LIFE

Average blood volume in 3rd trimester = 6L

Haematocrit = 35%

Blood loss = 50% of blood volume
No fluid replacement

Blood loss = 50% of blood volume
But with fluid replacement

Haematocrit = 17%

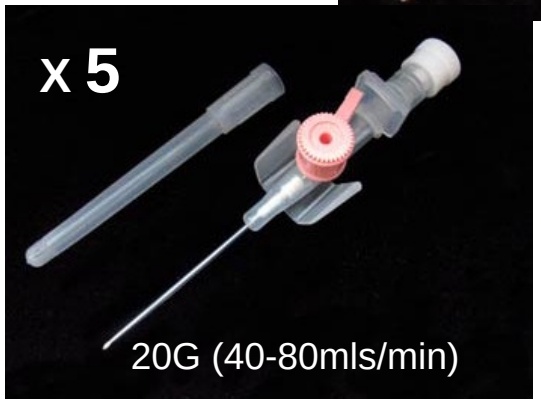
Which Fluid?

Crystalloid *vs* Colloid

How much fluid?

3 Fluid
to
1 Blood

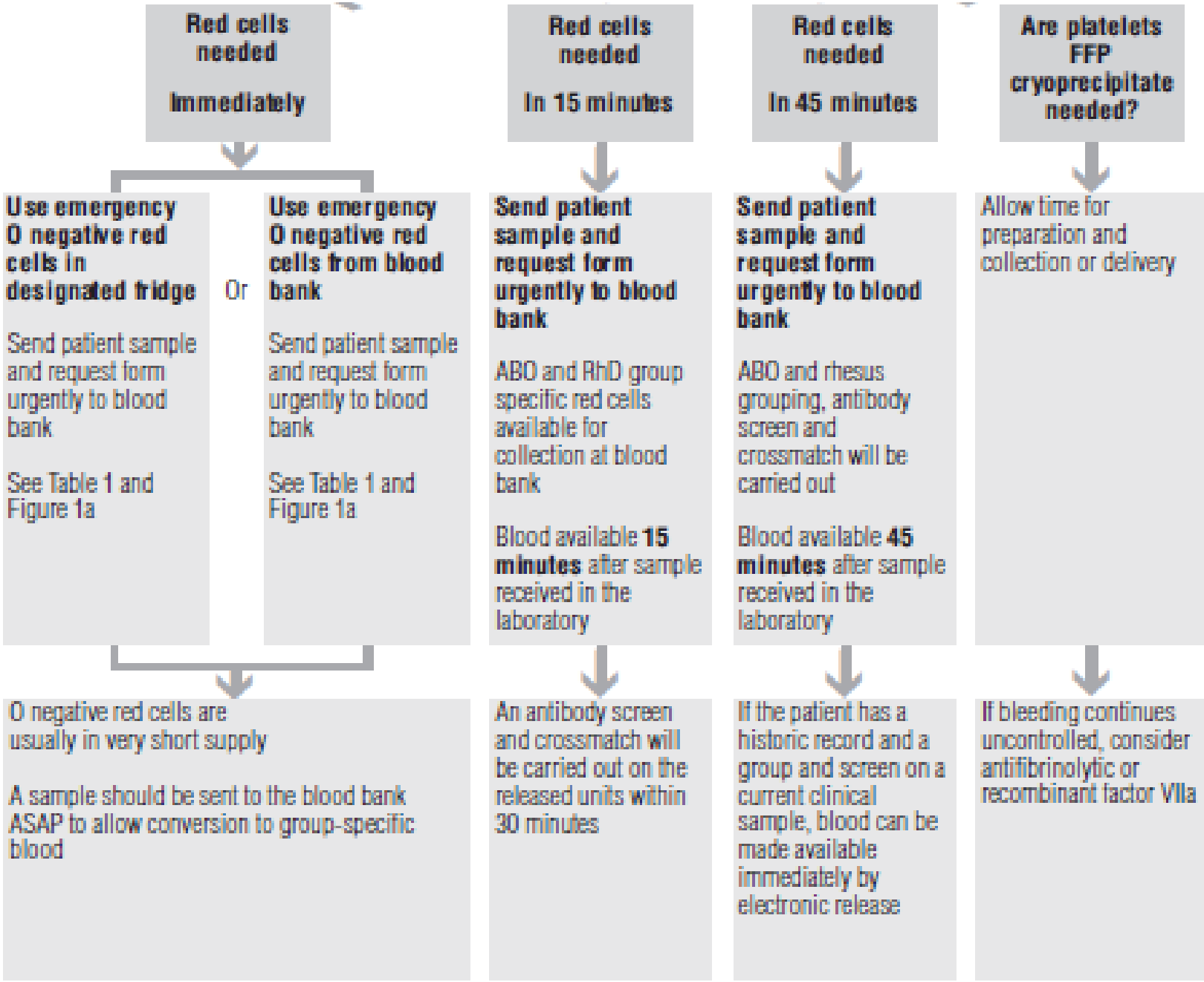
=



Relative flow rates

What's in Blood?

- Plasma volume: Replace after 1L loss (fluid replacement)
- Red cells: Replace after 2L loss (e.g. O neg blood)
- Coagulation factors/Platelets: Replace after 5L loss


Red cells needed
Immediately
Red cells needed
In 15 minutes
Red cells needed
In 45 minutes
Are platelets FFP cryoprecipitate needed?
Use emergency O negative red cells in designated fridge
Send patient sample and request form urgently to blood bank
See Table 1 and Figure 1a
Or
Use emergency O negative red cells from blood bank
Send patient sample and request form urgently to blood bank
See Table 1 and Figure 1a
Send patient sample and request form urgently to blood bank
ABO and RhD group specific red cells available for collection at blood bank
Blood available 15 minutes after sample received in the laboratory
Send patient sample and request form urgently to blood bank
ABO and rhesus grouping, antibody screen and crossmatch will be carried out
Blood available 45 minutes after sample received in the laboratory
Allow time for preparation and collection or delivery
O negative red cells are usually in very short supply
A sample should be sent to the blood bank ASAP to allow conversion to group-specific blood
An antibody screen and crossmatch will be carried out on the released units within 30 minutes
If the patient has a historic record and a group and screen on a current clinical sample, blood can be made available immediately by electronic release
If bleeding continues uncontrolled, consider antifibrinolytic or recombinant factor VIIa

Monitoring

- Assess for shock and effectiveness of resuscitation
- Respiratory rate and capillary refill useful
- Don’t rely on systolic BP as main sign
- Urine output
- Consider invasive monitoring but should not delay fluid resuscitation
- Document resuscitation and treatment

Stopping the bleeding

- Treatment for atony
  - empty bladder
  - uterine compression
  - commence uterotonic therapy
- Transfer to theatre for EUA
- Continue resuscitation including blood therapy

Table 2. Therapies for haemorrhage and complications according to reported cause of haemorrhage*

Therapy	Uterine atony alone (*n* = 137), *n* (%)	Placenta accreta/percreta/ increta alone (*n* = 91), *n* (%)	Both uterine atony and placenta accreta (*n* = 30), *n* (%)	Other causes (*n* = 55), *n* (%)
Syntocinon infusion	126 (92)	66 (73)	30 (100)	37 (67)
Ergometrine	84 (61)	26 (29)	16 (53)	15 (27)
Prostaglandin F2α	104 (76)	31 (34)	22 (73)	14 (25)
Misoprostol	22 (16)	3 (3)	1 (3)	5 (9)
Bimanual compression	9 (7)	4 (4)	1 (3)	2 (4)
Intrauterine balloons	43 (31)	25 (27)	9 (30)	6 (11)
B-Lynch or brace suture	34 (25)	2 (2)	7 (23)	7 (13)
Uterine or iliac artery ligation	18 (13)	9 (10)	4 (13)	3 (5)
Factor VIIa	16 (12)	9 (10)	2 (7)	1 (2)
Intra-abdominal packing	18 (13)	14 (15)	3 (10)	5 (9)
Uterine artery embolisation	5 (4)	3 (3)	0 (0)	1 (2)
Other	10 (7)	13 (14)	3 (10)	8 (15)
Complication				
Total hysterectomy	58 (42)	52 (57)	10 (33)	28 (51)
Bladder damage**	11 (8)	21 (23)	2 (7)	4 (7)
Ureter damage	8 (6)	4 (4)	2 (7)	4 (7)
Ovary removal	11 (8)	6 (7)	1 (3)	10 (18)
Any further surgery	23 (17)	23 (25)	6 (20)	10 (18)
Median units of blood transfused (range)*	12 (0–116)	10 (0–31)	10 (0–80)	9 (0–25)

*Information missing for two women.
**$P < 0.01$ for difference between groups.

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Factor VIIa	16 (12)
Intra-abdominal packing	18 (13)
Uterine artery embolisation	5 (4)
Other	10 (7)

Surgical intervention

- Exploration of genital tract for trauma or retained placenta
- Rüsch catheter
- B-Lynch brace suture
- Vessel ligation and embolisation
- Subtotal hysterectomy

Other interventions

- Blood cell salvage
- Radiological vascular embolisation
- Factor 7

Afterwards

- ICU admission
- Hyperbaric therapy
- Thromboprophylaxis
- Anaemia management
  Erythropoietin 300U/kg x3 per week
  Iron supplementation (IV iron sucrose 200mg x3 /week)
- Patient counseling
- Team debriefing

Management of Massive Obstetric Haemorrhage

- Be prepared
- Diagnose and declare
- Instigate immediate management
- 4 key simultaneous components
  - Communication
  - Resuscitation
  - Monitoring
  - Treatment

Management of Massive Obstetric Haemorrhage

- Be prepared – Practise drills, Risk assess
- Diagnose and declare
- Instigate immediate management
- 4 key simultaneous components

  Communication - Get help

  Resuscitation - Give fluid

  Monitoring - Reassess

  Treatment - Treat atony

Bringing it together

Skills for multidisciplinary teamwork and communication

Crisis Preparation

Crisis Management

Good Team Work

The Team Leader

Good Communication

- **Antepartum haemorrhage:** Bleeding from the genital tract between 28 completed weeks of pregnancy and the onset of labour.

- **Postpartum haemorrhage:**
  - Primary = blood loss from the genital tract of ≥ 500 ml in the first 24 hours
  - Severe = blood loss ≥ 1000 ml in first 24 hours
  - Secondary (delayed) = blood loss > 24 hours until 6 weeks post delivery

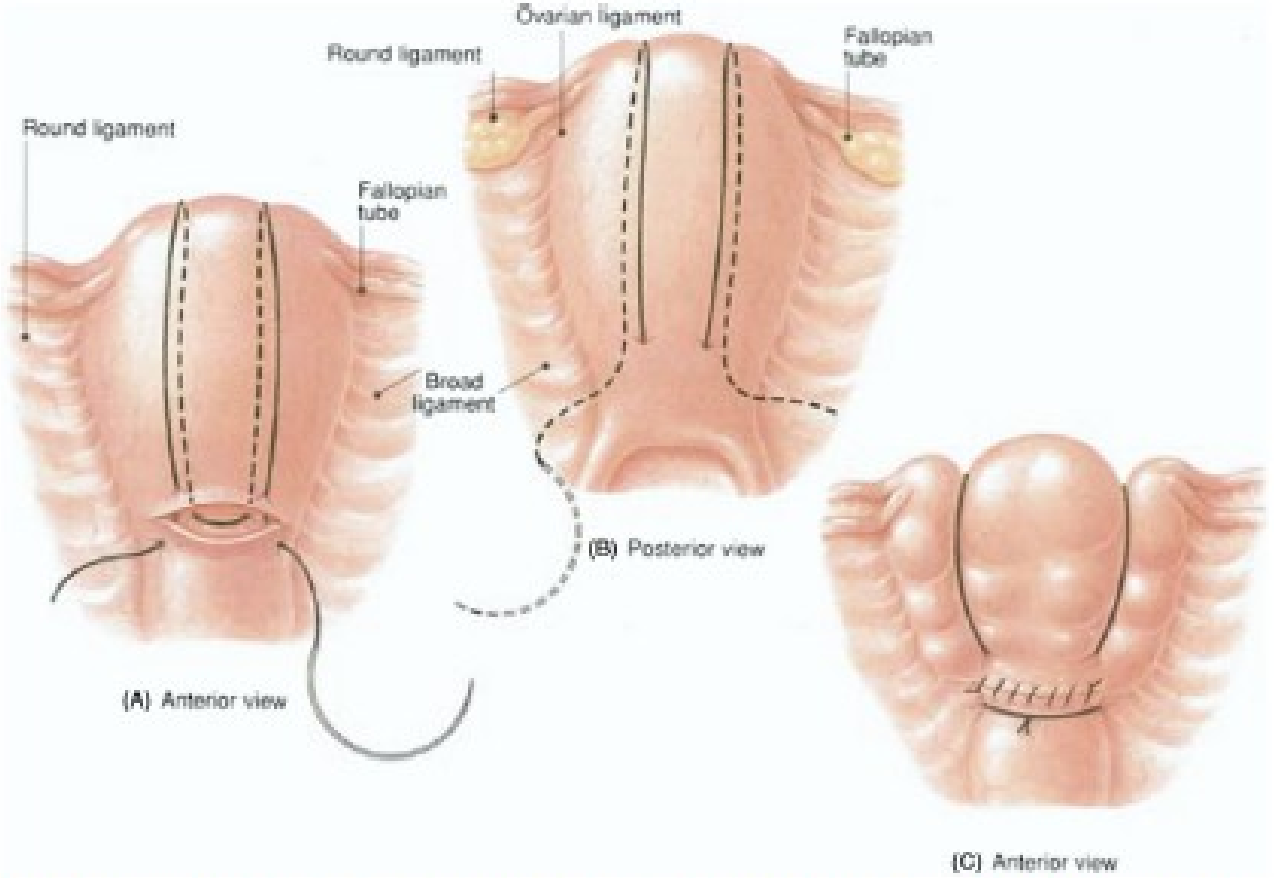
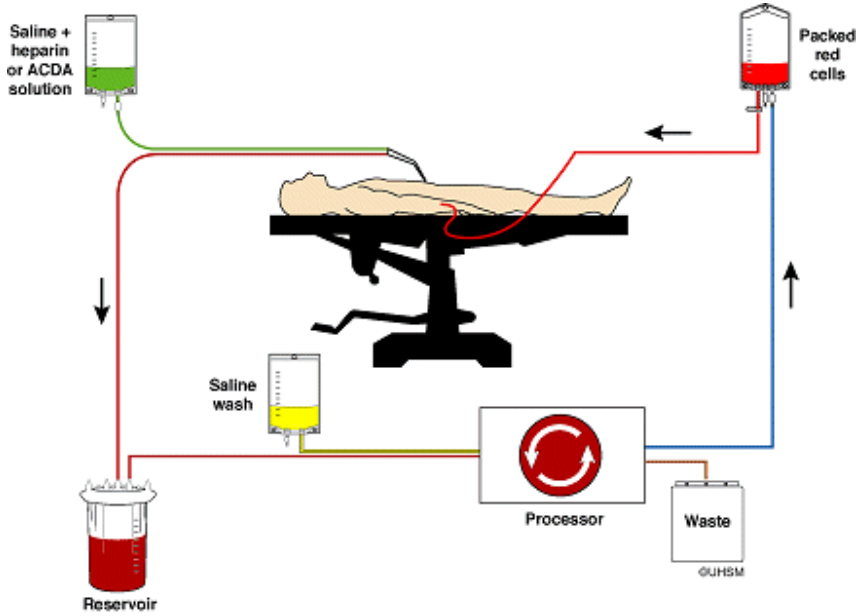


Figure 1 Lynch suture (A) anterior and and (B) posterior views of the uterus demonstrating the B-Lynch brace suture. (C) Anatomical appearance after uterine closure. (Adapted from http://www.cblynch.com/HTML/bjog1.html). (Color version of figure is available online.)

Issue date: November 2005

NHS
National Institute for
Health and Clinical Excellence

Intraoperative blood cell salvage in obstetrics



- Washing removes 95-98% plasma contaminants
- Can return 75-85% of shed blood
- Re-infusate blood has 60-70% haematocrit

Issue date: November 2005

NHS
National Institute for
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Intraoperative blood cell salvage in obstetrics

- Amniotic Fluid Embolism
- Rhesus immunisation
- Rate at which blood can be returned limited by filter
- Coagulation factors still needed

Leukocyte depletion filter

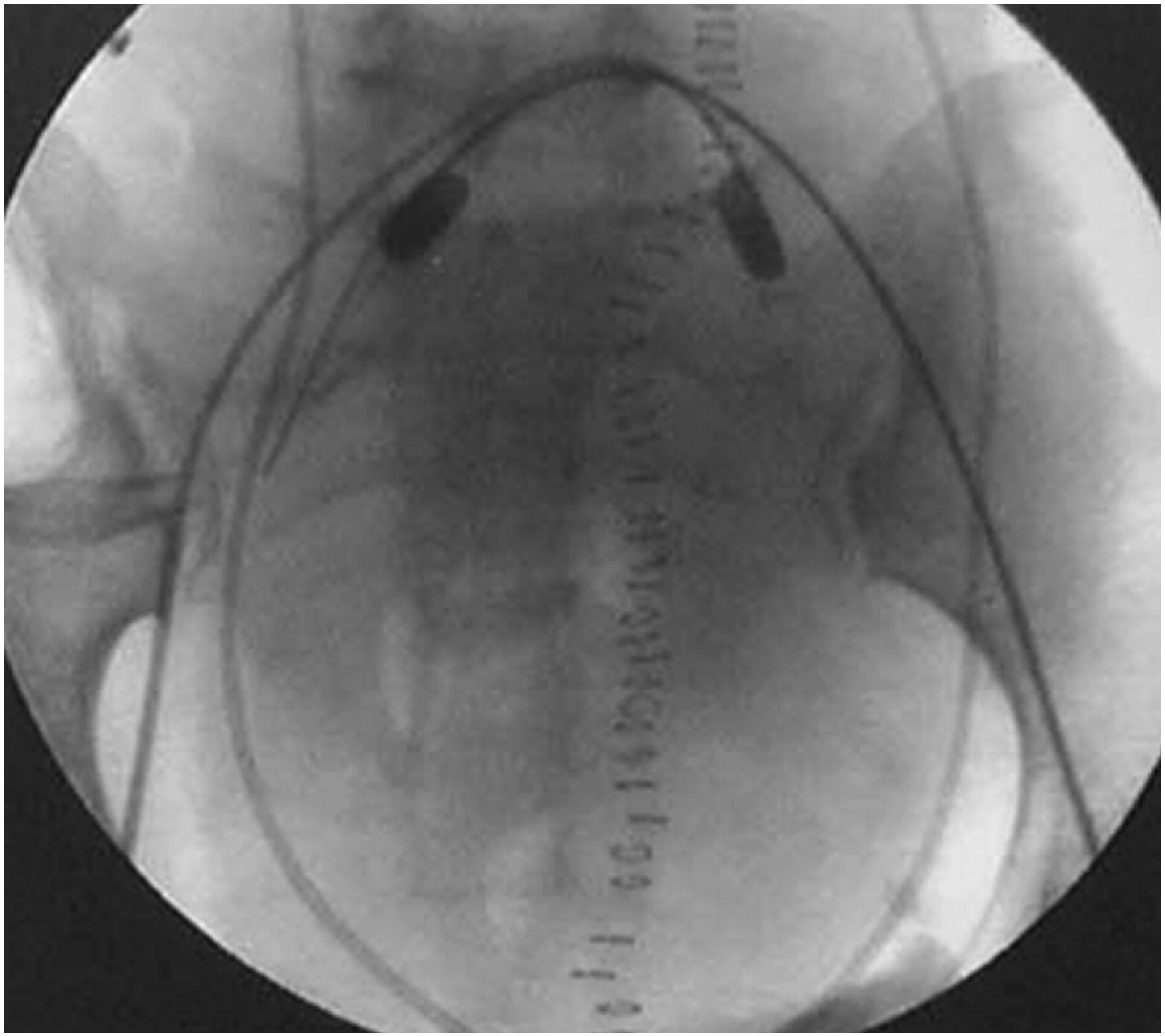
Flow rate 80ml/min @ 300mmHg

Correct everything else first

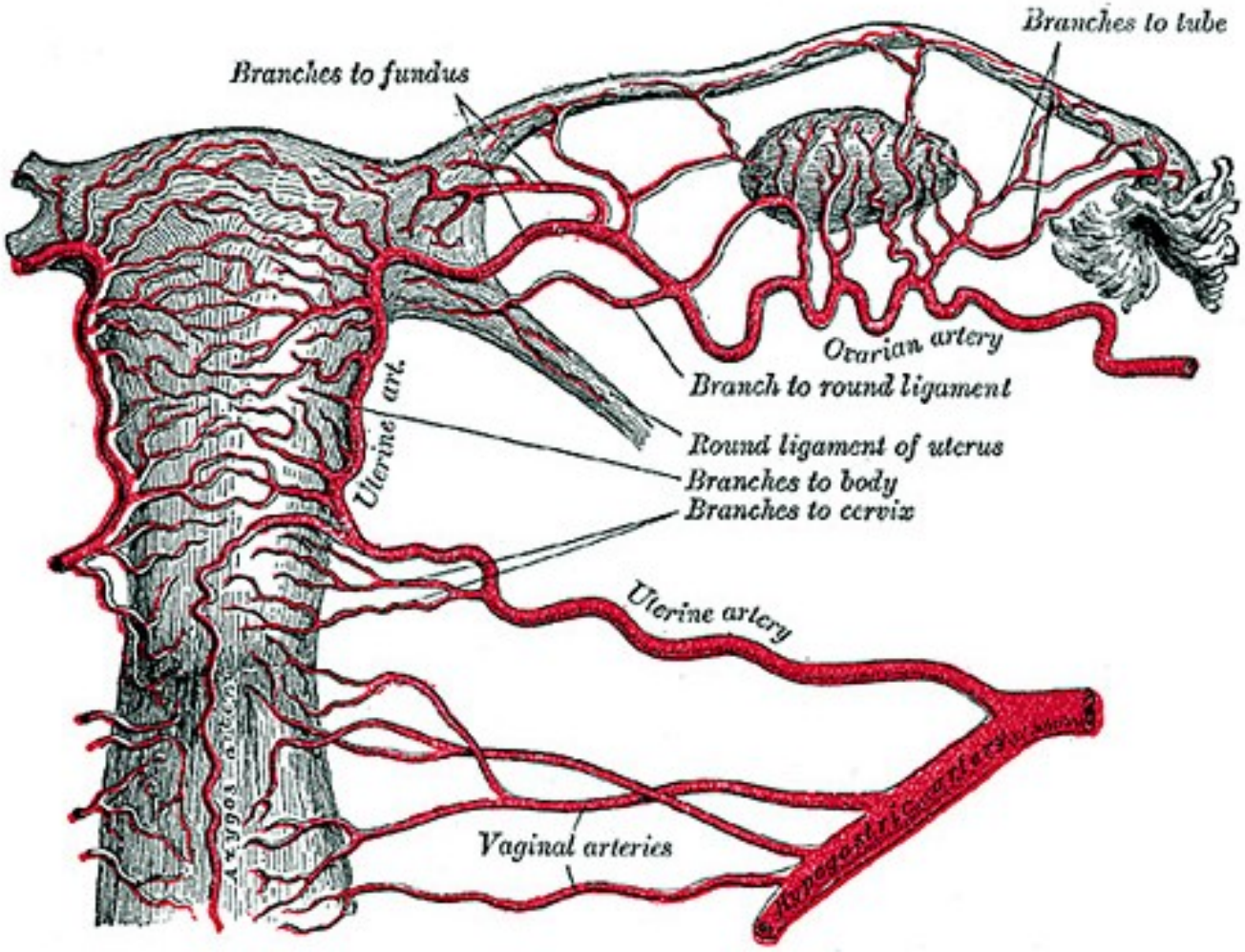
Will not stop surgical bleeding

Single standard dose £4000

--31-year-old woman with placenta percreta



Tan, C. H. et al. Am. J. Roentgenol. 2007;189:1158-1163


Branches to tube
Branches to fundus
Ovarian artery
Branch to round ligament
Round ligament of uterus
Uterine art.
Branches to body
Branches to cervix
Uterine artery
Vaginal arteries