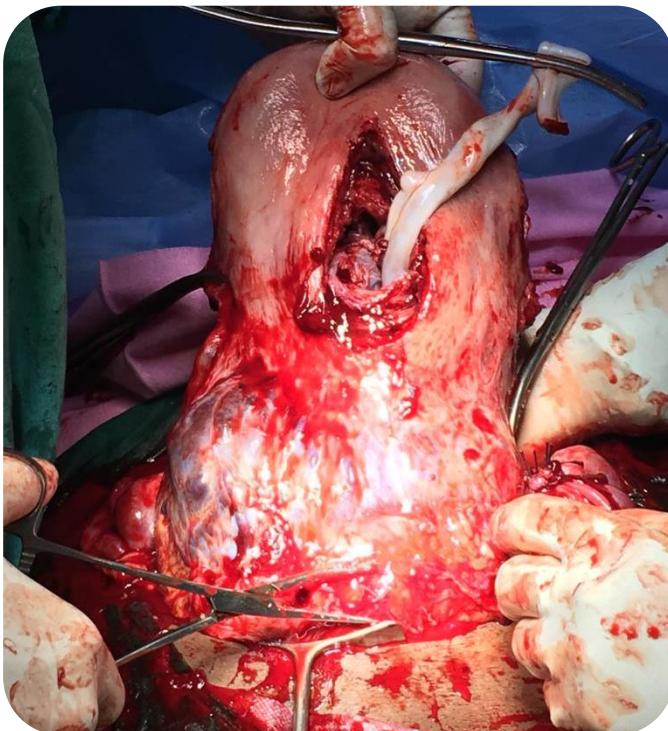


Greetings from Modern Government Maternity Hospital, Petlaburj & Osmania Medical College, Hyderabad.



Major Obstetric Haemorrhage

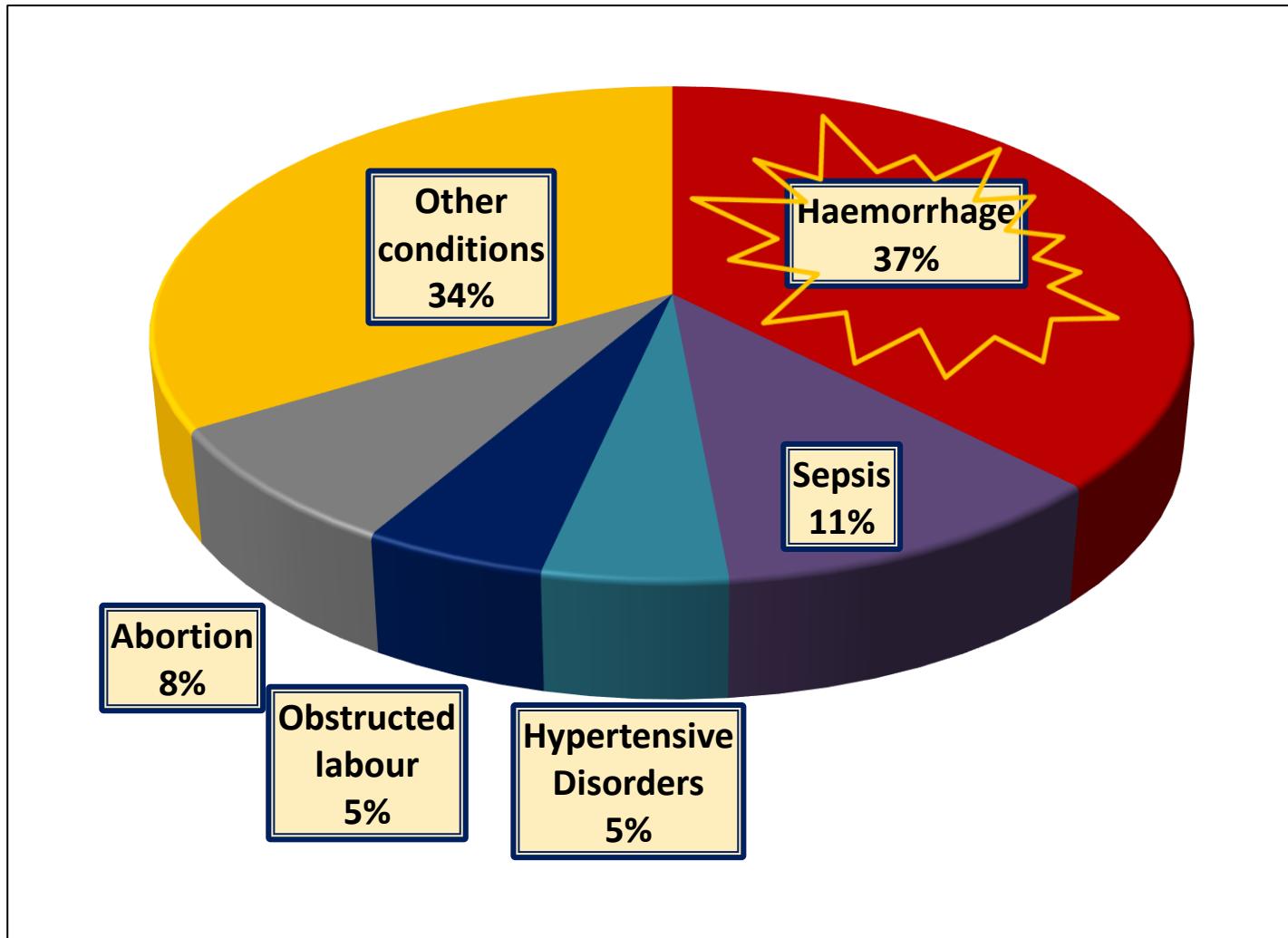


Dr Kousalya Chakravarthy
Associate Professor, MGMH Petlaburj
Osmania Medical College
Hyderabad

Causes of Massive Haemostatic Failure in Obstetrics

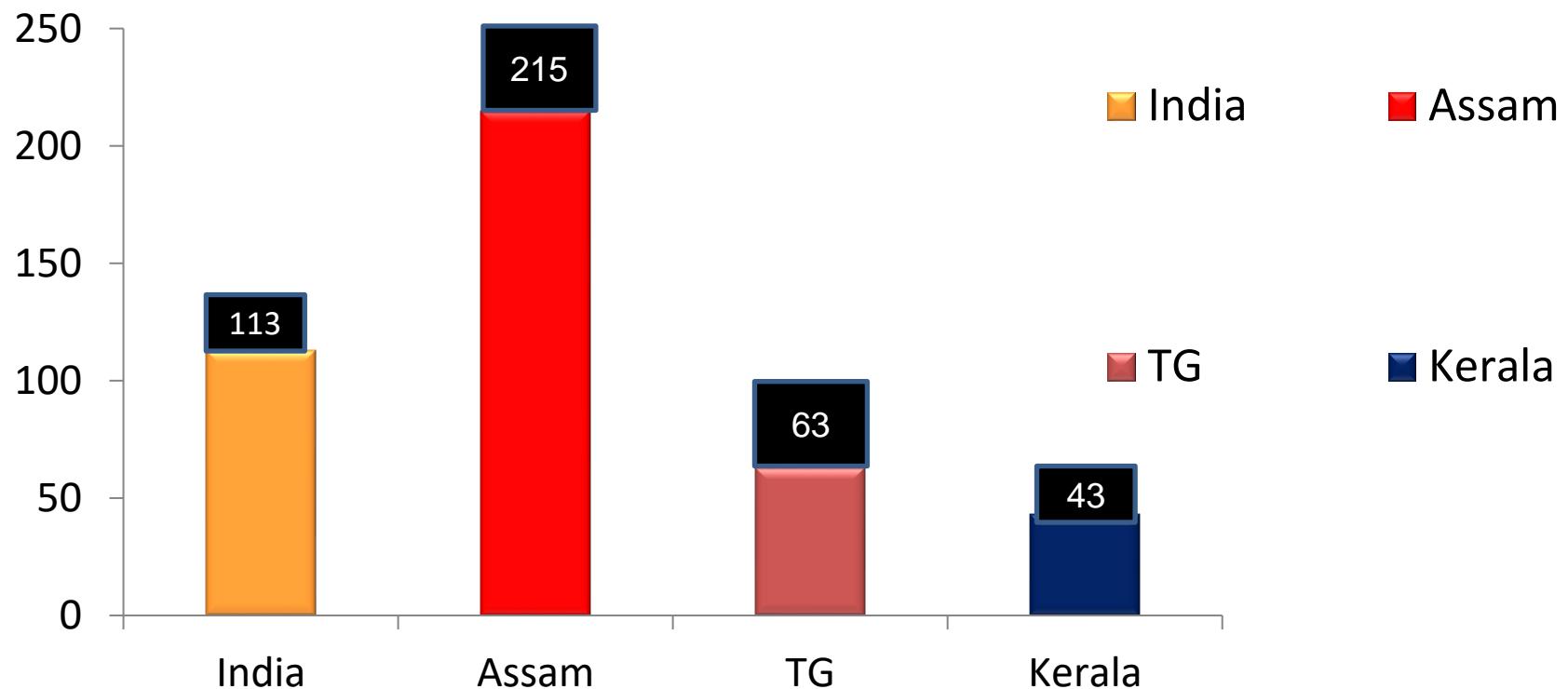
- Massive Obstetric Haemorrhage : APH /PPH
- Maternal Sepsis – MODS – Coagulation Failure
- Chorioamnionitis / Puerperal sepsis
- HELLP/ AFLP/ Amniotic fluid embolism
- Jaundice complicating Pregnancy / Hepatic disorder
- Inherent coagulopathies
- Acquired haemophilia / platelet disorders
- Pregnant patients on anticoagulants

Causes of Maternal Death in India

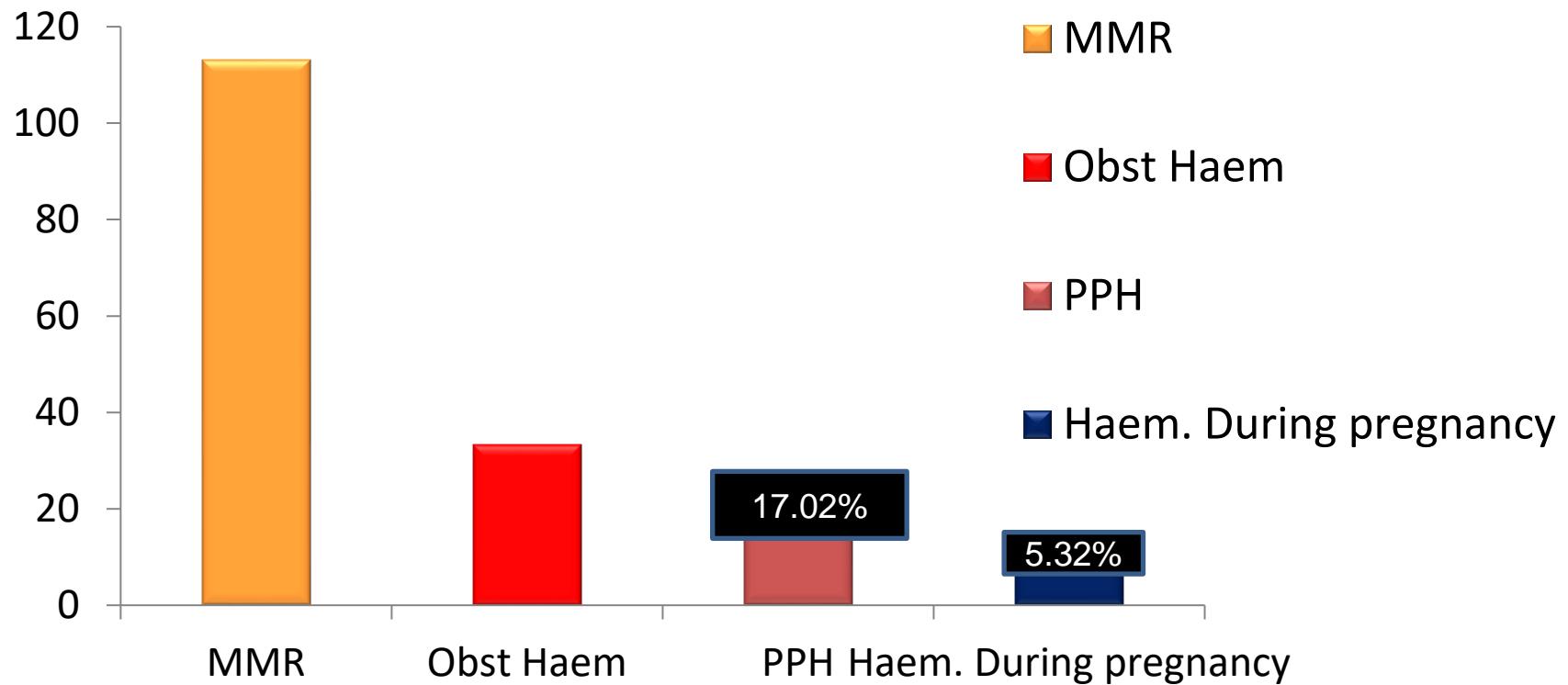


Obstetric haemorrhage in India

Maternal Mortality in India 113



Obstetric haemorrhage in India 2007-2009



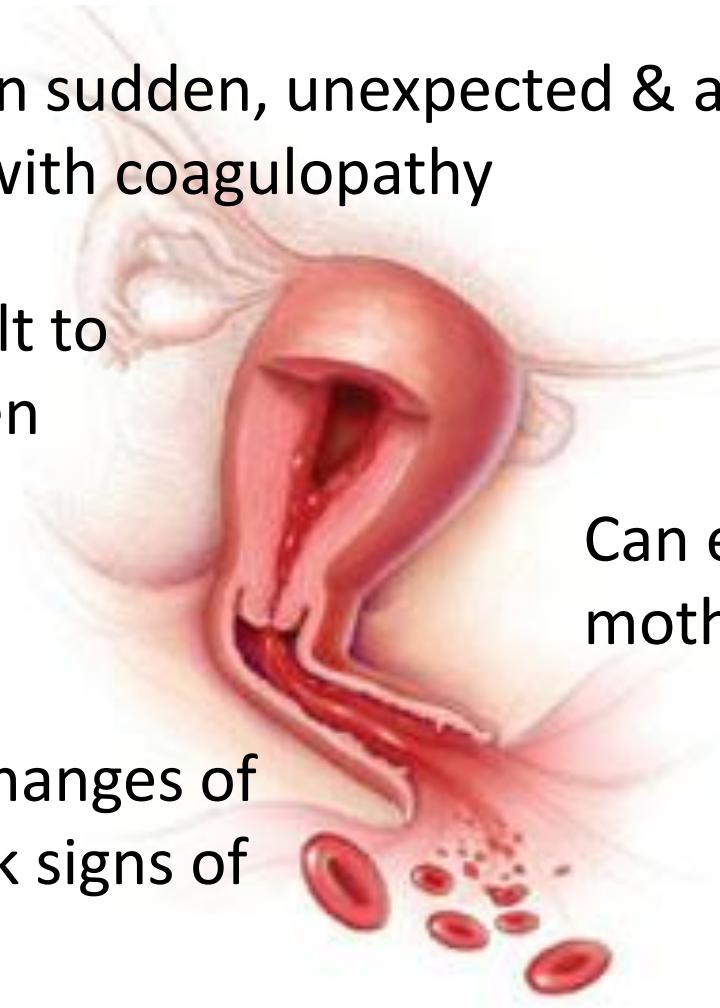
WHAT MAKES OBSTETRIC HAEMORRHAGE DREADED?

Is often sudden, unexpected & associated early with coagulopathy

Blood loss difficult to quantify & is often underestimated

Physiological changes of pregnancy mask signs of hypovolaemia

Can exsanguinate the mother in 6 - 8 minutes



What is Massive obstetric haemorrhage?

- The loss of more than 1 blood volume within 24 hours (around 70 ml/kg, or more than 5 litres in a 70 kg adult).
- A loss of 50% of total blood volume in under 3 hours.
- Bleeding in excess of 150 ml/minute in adults.
- As a practical clinical definition, bleeding which leads to:
 - a systolic blood pressure of less than 90 mm/Hg or
 - a heart rate of more than 110 beats per minute in adults.

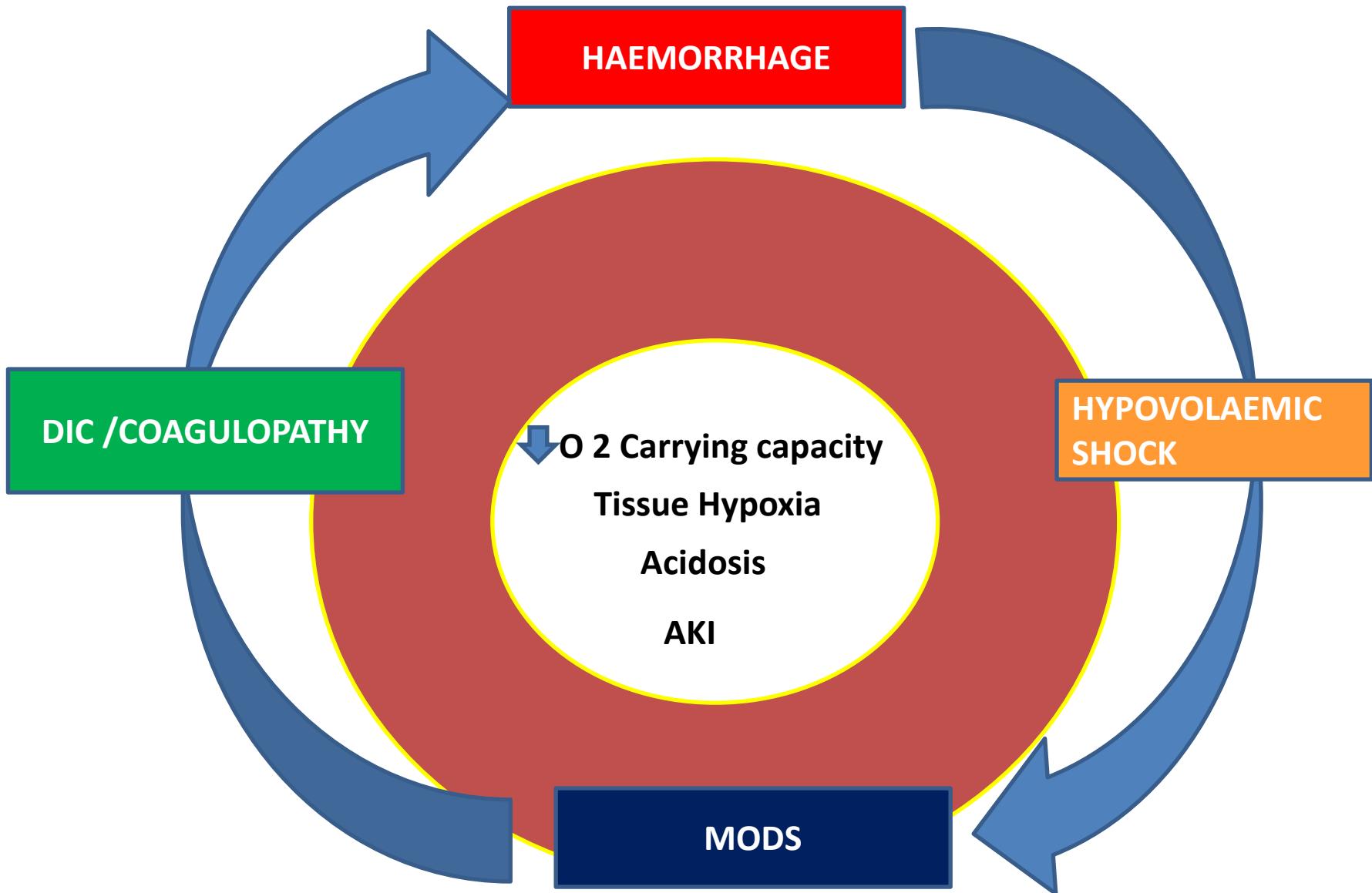


NICE guideline

Published: 18 November 2015

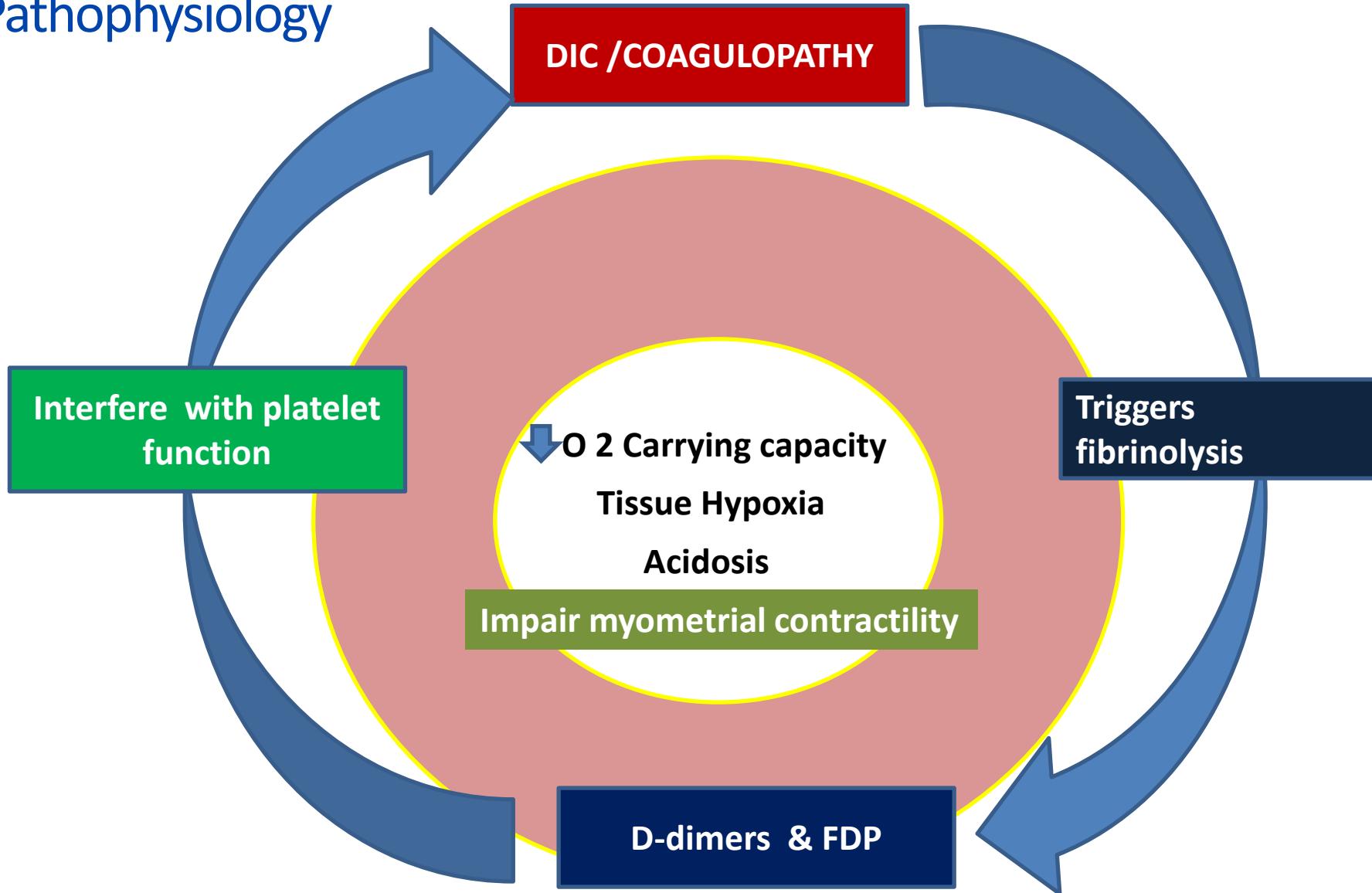
nice.org.uk/guidance/ng24

Pathophysiology of Hypovolemic Shock



Disseminated Intravascular coagulation

Pathophysiology



Factors contributing to maternal and foetal morbidity/ Massive Haemostatic Failure

1. Lack of anticipation of bleeding
2. Lack of awareness of severity of bleeding and prompt recognition
3. Lack of right decision at the right time
4. Inadequate supplementation of blood and blood products

Aggravated by

Early onset of DIC in the parturients

Anticipation of Obstetric Haemorrhage

Ante partum haemorrhage

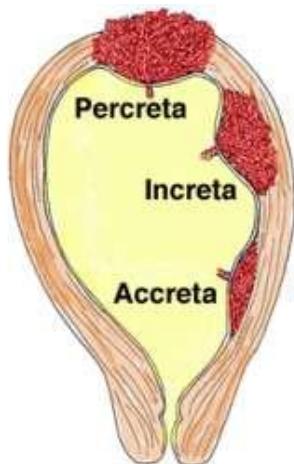
1. Placenta praevia
2. Placental abruption
3. Uterine rupture
4. Trauma

PPH

1. Tone – uterine atony
2. Tissue – retained products of conception
3. Trauma – genital tract injury
4. Thrombin – inherited or acquired coagulopathy

RECOGNIZING ACUTE OBSTETRIC HAEMORRHAGE

Suspect APH
if the patient
has....



- Unexplained tachycardia
- Tachypnoea
- Hypotension
- Pallor
- Poor urine output
- Pathological CTG changes

IDENTIFICATION AND RECTIFICATION OF THE CAUSE

APH

- O₂, Head down with LUD
- Crystalloid resuscitation
- US Scan to identify the cause
- Plan mode of delivery
- Correction of coagulopathy
- Activate massive transfusion protocol

In cases of APH anticipate massive PPH !!!

Early Identification of PPH

PPH –
Estimation
of blood loss

- Blood soaked pads, swabs
- Amount in the suction apparatus
- Mixing of amniotic fluid with the blood
- Bleeding under the drapes
- Blood filled in the atonic uterus

Often underestimated!!

Improving the accuracy of estimated blood loss at obstetric haemorrhage using clinical reconstructions

P Bose,^a F Regan,^b S Paterson-Brown^a

Blood soaked pads,
swabs

PPH – Estimation of blood loss

Bleeding under
the drapes

A Pictorial Reference Guide to Aid Visual Estimation of Blood Loss at Obstetric Haemorrhage: Accurate Visual Assessment is Associated with Fewer Blood Transfusions

Dr Patrick Bose, Dr Fiona Regan, Miss Sara-Paterson Brown



Soiled Sanitary Towel
30ml



Soaked Sanitary Towel
100ml



Small Soaked Swab 10x10cm
60ml



Incontinence Pad
250ml



Large Soaked Swab 45x45cm
350ml*



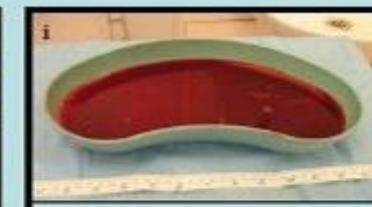
100cm Diameter Floor Spill
1500ml*



PPH on Bed only
1000ml



PPH Spilling to Floor
2000ml



Full Kidney Dish
500ml

*Multidisciplinary observations of estimated blood loss revealed that



Dry Weight – 20 gm

12 x 12 inches Swab

PPH –
Estimation
of blood loss

60 ml, dripping

25 ml



50 ml



Obstetric Haemorrhage

Green-top Guideline No. 52

Peer Review Draft – September 2015

Prevention and Management of Postpartum Haemorrhage

- Minor 500–1000mls
- Major
 - Moderate 1000–2000mls
 - Severe > 2000
- >40% blood volume –life-threatening

Early recognition of signs & symptoms

CATEGORIZATION OF ACUTE HAEMORRHAGE

	Class 1	Class 2	Class 3	Class 4
Blood loss %	15%	15%-30%	30%-40%	>40%
Pulse rate	<100	>100	>120	>140
Pulse pressure	Normal	Decreased	Decreased	Decreased
Blood pressure	Normal / increased	Decreased	Decreased	Decreased
Resp. rate	15 - 20	20 - 30	30 - 35	> 35
Urine output	> 30 ml	20 – 30 ml	5 – 15 ml	Negligible
Mental status	Slightly anxious	Mildly anxious	Anxious /confused	Lethargic



Predictors of adverse maternal outcomes

Indicators of hypovolemia

- Pulse pressure (PP)
- Shock index (SI): PR divided by systolic blood pressure
- Rate over pressure evaluation (ROPE) index: PR divided by pulse pressure

A ROPE > 3.0 had a positive predictive value of 53% < 3.0 had a negative predictive value of 86% for the development of decompensated shock.

Predictors of adverse maternal outcomes

Obstetric Shock index : the ratio of pulse to SBP

- Normal SI range of **0.7–0.9** for obstetric populations
- 0.9 representing the transition into abnormality
- SI of
 - 0.9 indicate the need for referral
 - **1.4** indicate urgent need for intervention in **tertiary** facilities
 - **1.7** indicating high chance of **adverse outcome**.

Le Bas A et al. Use of “Obstetric shock index” as an adjunct in identifying significant blood loss in patients with massive PPH. **Int. J Gynecol Obstet 2014;124:253-5**

Predictors of adverse maternal outcomes

Decreasing Fibrinogen Levels – Early Predictor of severe PPH

The decrease of fibrinogen is an early predictor of the severity of postpartum hemorrhage

Charbit B, Mandelbrot L, Samain E, Baron G, Haddaoui B, Keita H, Sibony O, Mahieu-Caputo D, Hurtaud-Roux MF, Huisse MG, Denninger MH, de Prost D, for the PPH Study Group. J Thromb Haemost 2007; 5: 266–73.

$P < 0.0001$

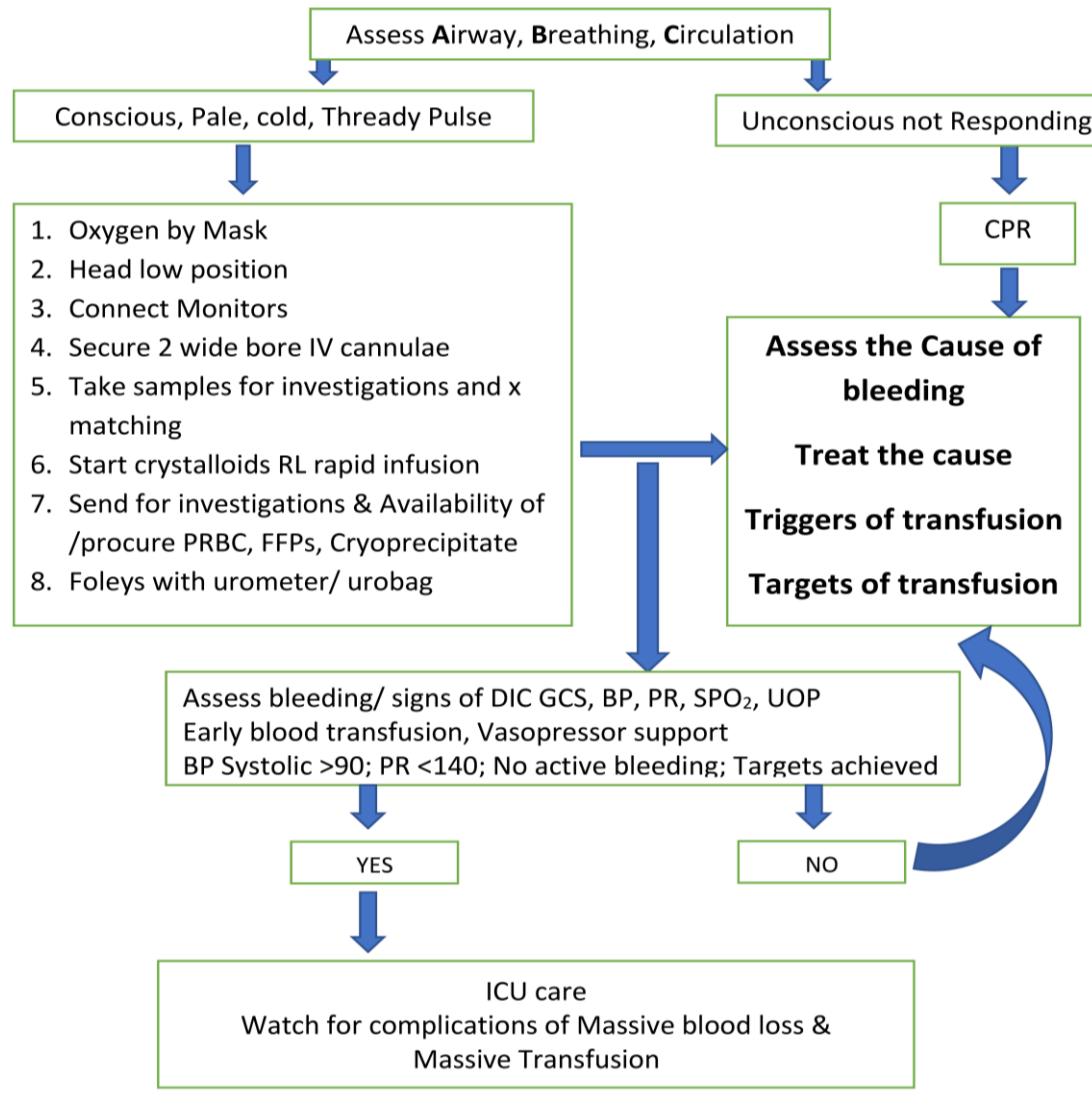
- Decreasing plasma fibrinogen independently associated with progression to severe PPH.
- Fibrinogen $>4 \text{ g litre}^{-1}$ had a NPV (negative predictive value) of 79% for severe haemorrhage
- Fibrinogen $\leq 2 \text{ g litre}^{-1}$ had a PPV (positive predictive value) of 100%.



Conclusion: These findings indicate that a simple fibrinogen

Cortet M, Deneux-Tharaux C, Dupont C, et al. Association between fibrinogen level and severity of postpartum haemorrhage: secondary analysis of a prospective trial. Br J Anaesth 2012; 108:984.

ALGORITHMIC APPROACH TO A BLEEDING PARTURIENT



Triggers of Transfusion

- Hb < 6 gms % / Hct < 16-18%
- PT / aPTT >1.5 times
- INR >1.5
- Platelets < 50000 / cc
- Fibrinogen < 100 mgs/dl

Targets of Transfusion

- Hb 8 gms % / Hct >24%
- PT – Test <6sec of control
- INR < 1.5
- Platelets > 50000 / cc
- Fibrinogen > 150 mgs/dl

5step management plan for massive obstetric hemorrhage

1. Organization of the multidisciplinary team
2. Restoration of circulating volume
3. Correction of defective coagulation
4. Evaluation of response to treatment
 1. Appropriate laboratory tests
 2. Vigilant haemodynamic monitoring
 3. Setting realistic targets or end points
 4. Direct observation
5. Remedyng of the underlying cause of the bleeding

Management of major obstetric haemorrhage

Communication

Resuscitation

Monitoring & Investigations

Arresting the bleeding

Should all occur simultaneously

NICE guideline

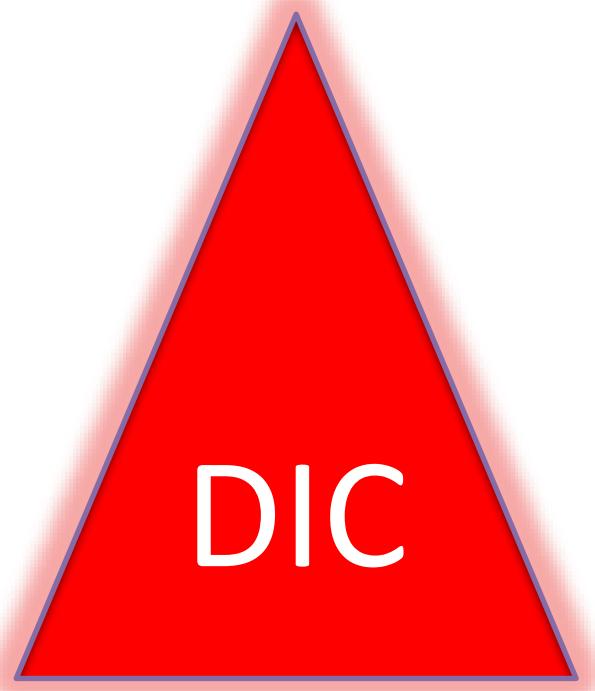
Published: 18 November 2015

nice.org.uk/guidance/ng24

Monitoring: POC

- CVP Vs IBP
- Coagulation Profile
- TEG - POC
- Hemocue Hb - POC
- Prevention of Lethal Triad – ABG; POC
- Ca⁺⁺ and K⁺ - POC / ABG

Acidosis



DIC

Hypoth-
ermia

Coagul-
opathy

Maintaining Temperature

- Core temp monitoring
- Blood and Fluids warmer / “Warm” fluids
- Patient warmer



? Crystalloid vs. Colloids in massive Obstetric Hemorrhage

Effects of Fluid Resuscitation With Colloids vs Crystalloids on Mortality in Critically Ill Patients Presenting With Hypovolemic Shock. The CRISTAL Randomized Trial

JAMA. 2013;310(17):1809-1817.
doi:10.1001/jama.2013.280502.

Mortality in Patients With Hypovolemic Shock Treated With Colloids or Crystalloids

Anders Perner, Nicolai Haase, Jørn Wetterslev
JAMA. 2014;311(10):1067. doi:10.1001/jama.2014.830.

When to activate Massive Haemorrhage Protocol?

- Failure of 1st line of treatment for PPH
 - 2L crystalloids, Drugs & Bakri balloon
- Unresponsive to 2L / uncontrolled class 2
- PR>120/ SBP <90/decreasing PP despite fluids
- Vaginal delivery - Class 2 /3 needing surgical intervention

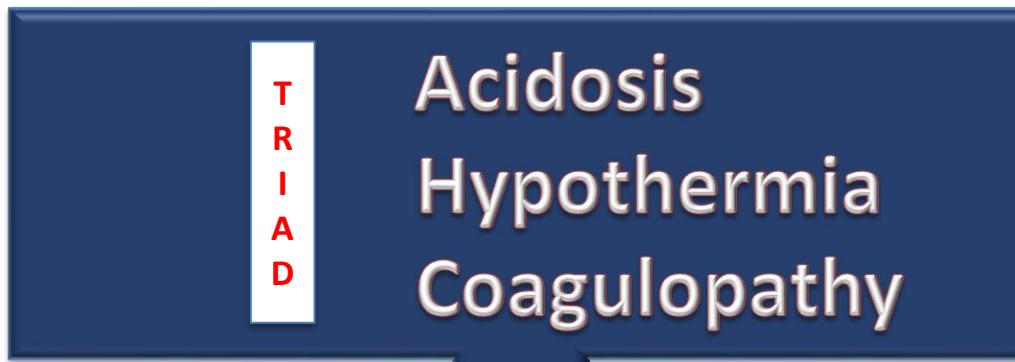
The Transfusion Trigger...

- Hb < 6 gms / dl
- Hct < 16-18%
- PT / aPTT >1.5 times
- INR - >1.5
- Platelets < 50000 / cc
- Fibrinogen < 150 mgs/dl



Early transfusion of blood is advocated for adequate tissue oxygenation

- Do not allow Hemoglobin to fall < 5gm
- Give supplemental Oxygen: Mask / ETT
- *Do not cause Dilutional coagulopathy*
- Prevent the “LETHAL TRIAD”



MODS - DEATH

Blood and Blood Components:

1 Unit of WB / PRBC

Increase Hb by 1gm / dl

FFP's: 12-15 ml / kg body weight

1 Unit / 10 kg body weight

Increases Fibrinogen by 100 mg /dl

Cryo precipitates:

2 pools (10 U) Increases

Fibrinogen by 100 mg / dl

Platelets:

1 Unit of RDP: Increase count by 5,000

1 Unit of SDP Increase count by 30,000

Recommendations for RBC: FFP: Platelet ratios



Royal College of
Obstetricians and
Gynaecologists

Setting standards to improve women's health

Green-top Guideline
No. 52
May 2009

Minor revisions November 2009 and April 2011

Fluid Therapy and blood product transfusion	
Crystalloid	Up to 2 L Hartmann's solution
Colloid	Up to 1-2 L until blood arrives
Blood	Crossmatched. If crossmatched blood is still unavailable, give Uncrossmatched group-specific OR RhD -ve blood
FFP	<u>4U for every 6U red cells or PT/APTT</u> $>1.5 \times \text{normal}$; 12-15ml/kg or total 1 L
Platelet concentrates	If PLT Count $<50 \times 10^9$
Cryoprecipitate	If fibrinogen $<1\text{g/L}$

(please refer to sections 6.2.1 and 6.2.2):

Recommendations for RBC:FFP:platelet ratios



PROPPR randomized clinical trial 2015

Pragmatic Randomized Optimal Platelet , plasma Ratio

- Plasma, platelets, RBCs 1:1:1 compared with 1:1:2
- More haemostasis within 24 hours (86 vs 78%)
- Reduction in pts who exsanguinated (9.2 vs 14.6%)
- Without a significant increase in complications

Holcomb JB, Tilley BC, Baraniuk S, et al. Transfusion of plasma, platelets, and red blood cells in a 1:1:1 vs a 1:1:2 ratio and mortality in patients with severe trauma: the **PROPPR randomized clinical trial**. *JAMA* 2015; 313:471.

Recommendations for RBC:FFP:platelet ratios

1 unit FFP for every 2 to 3 units of RBCs

Spahn DR, Bouillon B, Cerny V, et al. Management of bleeding and coagulopathy following major trauma: an updated European guideline. **Crit Care** 2013; 17:R76

4 units FFP for every 6 units of RBCs

Allard S, Green L, Hunt BJ. How we manage the haematological aspects of major obstetric haemorrhage. **Br J Haematol** 2014; 164:177.

4 pRBCs - 4 FFP, if no labs, bleeding is ongoing, and is due to atony;
1:1 pRBC:FFP ratio is maintained until tests are available .

Collins P, Abdul-Kadir R, Thachil J, Subcommittees on Women's Health Issues in Thrombosis and Haemostasis and on Disseminated Intravascular Coagulation. Management of coagulopathy associated with postpartum hemorrhage: guidance from the SSC of the ISTH. **J Thromb Haemost** 2016; 14:205.

1:1:1:1 in Obstetric Haemorrhage?

- If the PPH has **stopped** no FFP is required
- If hemorrhage is **ongoing** PT/APTT prolonged, 12–15 ml/kg of **FFP be infused**
- If the **PT/APTT is >1.5-times** normal, a larger volume of **FFP** is likely to be required
- If the **PT/APTT are normal** then **no FFP** is required, repeat test if bleeding persists

In the rare cases of massive bleeding where women have been give **8 units of RBCs and FFP** and they **continue to bleed** and still no coagulation results or platelet counts are available then **2 pools of cryoprecipitate and 1 pool of platelets** should be infused.¹⁰²

Early FFPs in Obstetric Haemorrhage

1. Placental abruption
2. Amniotic fluid embolism
3. Chorioamnionitis or sepsis
4. Established Coagulopathy
5. Massive Obstetric Haemorrhage (PAS)

Massive Transfusion Protocols...

**MASSIVE TRANSFUSION
PROTOCOL:
1:1:1:1
PRBCs:FFPs:Cryo: SDP**

**MTP – 1 = 4:4
MTP – 2 = 6:6:6 / Screen for SDP**

MTP – 3 = 6:6:10:6 RDP/ SDP

1. ANTICIPATED OBSTETRIC HAEMORRHAGE

ANTICIPATION OF THE PROBLEM

PREVENTION

Early pregnancy	Abortion Ruptured ectopic	
Antepartum haemorrhage	Placenta praevia Placental abruption Uterine rupture Trauma	<ol style="list-style-type: none"> 1. 2 wide bore peripheral IV cannulae 2. Blood products X matched & available 3. Depending on the pre-operative status consider IBP, CVP, CO monitoring 4. Prophylactic Oxytocics, PGs, Methergine etc ; AMTS 5. Early & timely surgical measures of tackling PPH 6. Rapid infusion device or pressure bags 7. Blood warmer and warming blanket 8. Consider elective interventional radiological procedures if available 9. Consider cell salvage if available 10. Anaesthesia: RA / GA
Primary postpartum haemorrhage	Tone- Atonic Uterus Tissue - Adherent placenta / Retained products of conception Trauma genital tract/ Acute uterine inversion Thrombin - Clotting defects	
Secondary postpartum haemorrhage	Pre-eclampsia/HELLP Puerperal sepsis Retained products of conception/ IUFD	

Fluid Therapy and Transfusion of Blood Products in Obstetric Haemorrhage

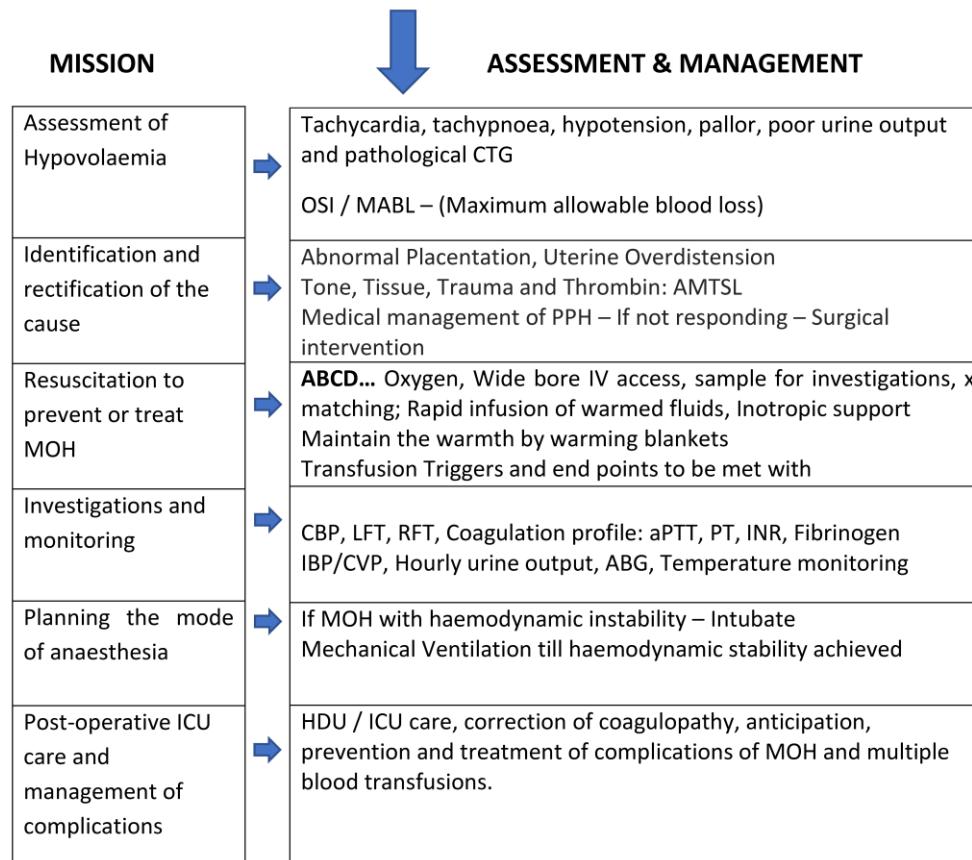
Crystalloid	Up to 2L RL
Colloid	Up to 1L till blood arrives (If SBP <90 despite crystalloids)
Blood (Always Packed Cells)	Early transfusion of blood is advocated for adequate tissue oxygenation
FFPs	4U for every 6U red cells or PT/aPTT >1.5xnormal: 12-15ml/kg or 1L
Cryo precipitate	If fibrinogen is < 100mg/dl
Platelets	If platelet count is < 50,000/mm ³

PRBC	1 U Increase Hb by 1gm / dl
FFFP's	12-15 ml/ kg Increases fibrinogen by 200 mg / dl
Cryo precipitates:	1 unit / 10 kg body weight; ↑ fibrinogen by 50 mg / dl
Platelets:	1U RDP ↑ count by 5,000; 1 U SDP ↑ count by 30,000 100 mg/dl

2 UNANTICIPATED OBSTETRIC HAEMORRHAGE

Principles of Management

1. Early recognition & accurate assessment of the magnitude of hypovolemia
2. Prompt Identification and rectification of the cause
3. Appropriate resuscitation to prevent or treat coagulopathy
4. Investigations and monitoring of the patient
5. Planning the mode of anaesthesia if outside Operating Room
6. Post-operative ICU care and management of complications



Complications of major PPH and Massive Transfusion

1. Haemorrhagic shock
2. Severe anaemia
3. Transfusion Related Acute lung injury / ARDS
4. Clotting disorders, Acute renal failure, End organ damage – MODS
5. Increased risk of thrombosis

Hemovigilance

Targets

of

Resuscitation

Mental status	Responsive to commands
Systolic BP	80 - 90 mm Hg
Heart rate	< 120 per min
Pulse oximeter	Saturation > 95%
Urine output	Present

Hemoglobin	> 8 gm / dl
Hematocrit	> 25 %
Prothrombin time	Test < 1.5 x C
Platelet count	> 50,000 / cc
Fibrinogen	> 200 mg / dl

pH	> 7.3 / SBE < -5
S Lactate	Improving

Tranexamic acid in Obstetric Bleed



STUDY PROTOCOL

Open Access

The WOMAN Trial (World Maternal Antifibrinolytic Trial): tranexamic acid for the treatment of postpartum haemorrhage: an international randomised, double blind placebo controlled trial

- Dose :
- 1 gm of TXA initially - IV
- Followed by 1 gm if bleeding continues

Recombinant Factor VIIa

Prerequisites for effective action



- Prior correction of coagulopathy
- Platelet count of > 50000
- Fibrinogen > 0.5g/litre and
- pH >7.2.

Initial dose

- 40 - 90 micrograms/kg

Repeat dose

- 90 -120 ug/kg after 1-2 hrs
- If bleeding persists after two doses, further dose is unlikely to be of benefit

Fibrinogen concentrate (RiaSTAP)

International Journal of Obstetric Anesthesia (2015) 24, 100–102
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<http://dx.doi.org/10.1016/j.ijoa.2015.03.001>



EDITORIAL

Coagulopathy and placental abruption: changing management with ROTEM-guided fibrinogen concentrate therapy

- Lyophilized Factor 1 powder
- Vial 900 to 1300 mg fibrinogen & 400 to 700 mg human albumin,
- ROTEM-guided fibrinogen concentrate administration reduced requirements for blood component therapy
- Trigger for administration: fibrinogen ≤150 mg/dL

Fibrinogen Concentrate 1 Vial = 1gm - 3gm

INTRAOPERATIVE CELL SALVAGE

Can reduce the amount of blood required

International Journal of Obstetric Anesthesia (2015) 24, 103–110
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<http://dx.doi.org/10.1016/j.ijoa.2014.12.001>

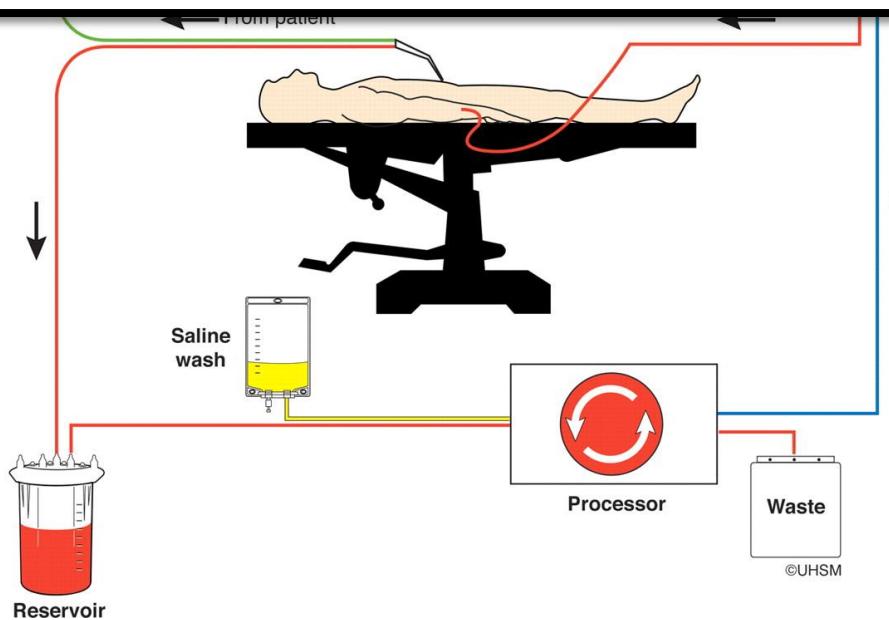


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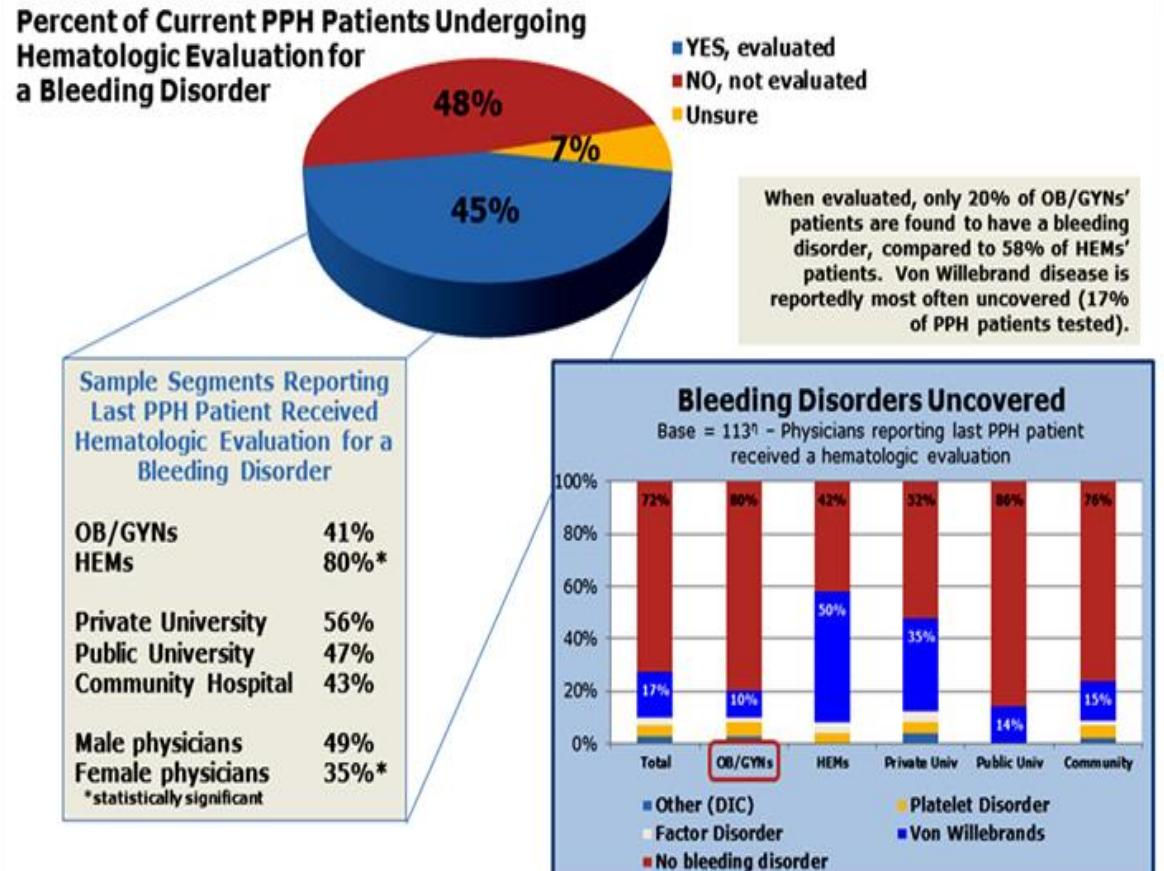
www.obstetanesthesia.com

ORIGINAL ARTICLE

Is cell salvaged vaginal blood loss suitable for re-infusion?



FOLLOW-UP OF PATIENTS AFTER SEVERE HEMORRHAGE



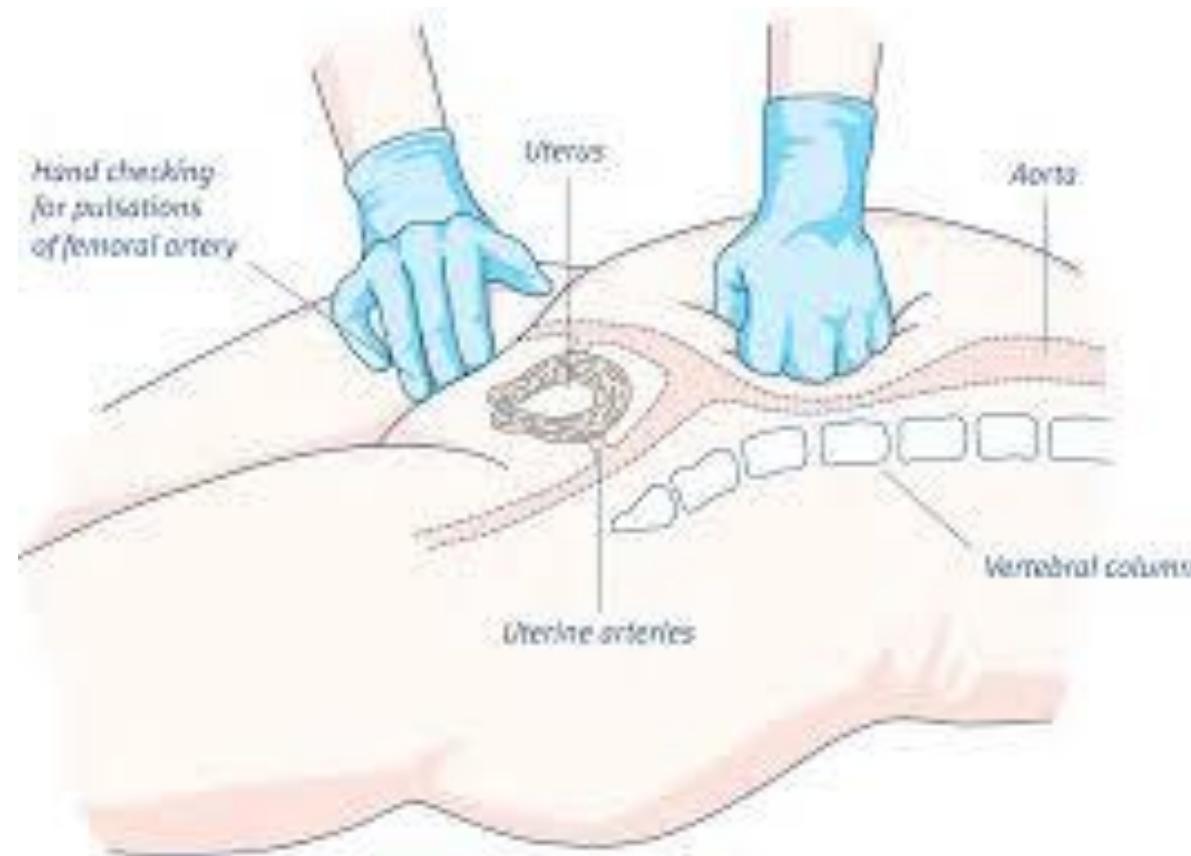
External Aortic Compression

(e) *Should external aortic compression be offered in the treatment of PPH?*

Summary of evidence

No trials were found describing the use of external aortic compression in the treatment of PPH. A prospective study was performed in Australia to determine the haemodynamic effects of external aortic compression in nonbleeding postpartum women (79). Successful aortic compression, as documented by absent femoral pulse and unrecordable blood pressure in a lower limb, was achieved in 11 of 20 subjects. The authors concluded that the procedure is safe in healthy subjects and may be of benefit as a temporizing measure in treatment of PPH while resuscitation and management plans are made. Subsequently, one case report from Australia described the use of internal aortic compression as a temporizing measure to control severe PPH due to placenta percreta at the time of caesarean section (80).

External Aortic Compression







To Summarize....

Parameters to be monitored	Transfusion Triggers	Targets of Transfusion	Action to be taken
GCS	Agitation/ drowsy	Verbal Response +	Supplemental oxygen 2L crystalloids / PRBC
Temperature	Temperature <35°C	Temperature 37 -38°C	Warmer Warm fluids
Haemoglobin	Hb < 7gm% with ongoing blood loss	Hb > 8gm%	PRBC UPTO 3
Platelet count	Platelet count <50 000	Platelet count > 50 000	4 RDPS (<70Kg) 6RDPS(.70Kg) or 1 SDP
Acid –base status	pH <7.2, base excess worse than –6, lactate >4 mmol/L	pH 7.35-7.45 Lactate clearance present	Fluid supplementation, haemodynamic stability through transfusions ± inotropes, Supplemental /100% oxygen.
PT/INR	PT >1.5 × normal INR >1.5	PT <1.5 × normal	MTP 1 : 4 PRBC 4FFP. MTP 2: 6PRBC, 6FFPs, 10 cryos; MTP 3: 6PRBC, 6FFPs, 10 cryos; 6RDP or 1
APTT	APTT >1.5 × normal		
Fibrinogen level	Fibrinogen level <200mg/%	Fibrinogen level ≥200mg/%	
Ionised calcium	ionised calcium <1.1 mmol/L	>1.1 mmol/L	Calcium gluconate 30gm over 30min To be repeated if necessary
Urine out put	≤ 30ml/hour	≥ 30ml/hour	



Conclusion

- Massive Obstetric Haemorrhage is a Preventable Mortality
- Anticipation, Early recognition and Prompt treatment can prevent the mortality in obstetric haemorrhage and lessen the morbidity in 90% of cases

Thank you