BLOOD TRANSFUSION IN OBSTETRICS:

AN EVIDENCE-BASED APPROACH

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Background

Anemia in pregnancy is ***defined*** as:

- **First trimester** : Hb < 11g/dl,
- **Second/third trimester :** Hb < 10.5 g/dl,
- **Postpartum:** Hb <10.0 g/dl,

British Committee for Standards in Hematology (BCSH) guidance].

WHO Hemoglobin and hematocrit cutoffs used to define anemia in people living at sea level

Age or sex group	Hemoglobin below:	Hematocrit below:
	g/dL	%
Children 6 months to 5 years	11.0	33
Children 5-11 years	11.5	34
Children 12-13 years	12.0	36
Nonpregnant women	12.0	36
Pregnant women	11.0	33
Men	13.0	39

From WHO/UNICEF/UNU, 1997

Indications of blood transfusion in obstetrics*

1. Anemia of pregnancy & Hemoglobinopathies
2. Obstetric hemorrhage
3. Surgeries where significant blood loss is expected.

The decision for transfusion should not be made on the basis of hemoglobin estimation alone, as healthy and clinically stable women do not require blood transfusion even with Hb of <7 g/dl.

Indications of blood transfusion in obstetrics

- Transfusion is necessary if **Hb <6 g/dl** and there are **<4** weeks for delivery.

- When Hb **is <7 g/dl** in labor or in immediate postpartum period, blood transfusion is only indicated if there is previous history of bleeding or patient is prone for bleeding due to some medical condition.
- Transfusion is also indicated if **Hb is 7 g/dl**, for women with continued bleeding or at risk of further significant hemorrhage or for those presenting with severe symptoms that need immediate correction (e.g. cardiac decompensation)

Minimize the risk of transfusion

(A).Optimization of Hb. in the antenatal period:

- For normocytic or microcytic anemia, a trial of ***oral iron*** should be considered as the *first step* . Further tests should be undertaken if there is no demonstrable rise in Hb. at 2 weeks and compliance has been checked.

Minimize the risk of transfusion

(A).Optimization of Hb. in the antenatal period:

- Pregnant women should be offered screening for anemia at booking and at 28 weeks.
- Women with ***multiple pregnancies*** should have an additional full blood count done at 20–24 weeks.

Minimize the risk of transfusion

(B).Treatment and management of anemia

- Health education about improvement of dietary iron intake and factors affecting absorption of dietary iron.
- Oral iron should be the preferred first-line treatment for iron deficiency.

Minimize the risk of transfusion

(B).Treatment and management of anemia

- Parenteral iron is indicated when:
  - oral iron is not tolerated or absorbed or
  - patient compliance is in doubt or
  -if the woman is approaching term and there is insufficient time for oral supplementation to be effective.

Minimize the risk of transfusion

(B).Treatment and management of anemia

The role of *recombinant human erythropoietin (rHuEPO)* for non-end-stage renal anemia is still to be established and it should only be used in the *context* of a *controlled clinical trial* or on the expert advice of the hematologist.

Minimize the risk of transfusion

(B).Treatment and management of anemia

- Active management of the third stage of labor is recommended to minimize blood loss.
- Women at high risk of hemorrhage should be advised to deliver in hospital.

General principles of blood transfusion

The consent

1. **Consent for blood transfusion ; a valid consent should be obtained where possible prior to administering a blood transfusion.**
2. **In an emergency, where it is not feasible to get consent, information on blood transfusion should be provided retrospectively.**
3. **The reason for transfusion and a note of the consent discussion should be documented in the patient's case notes.**

Requirements for group and screen samples and cross-matching

1. Blood group and antibody status checked at booking and at 28 weeks of gestation.
2. Group and screen samples used for provision of blood in pregnancy should be less than 3 days old.
3. In a woman at high risk of emergency transfusion, e.g. placenta praevia, and with no clinically significant alloantibodies, group and screen *samples should be sent once a week* to exclude or identify any new antibody formation and to keep blood available if necessary.
4. Close *liaison* with the hospital transfusion laboratory is essential.

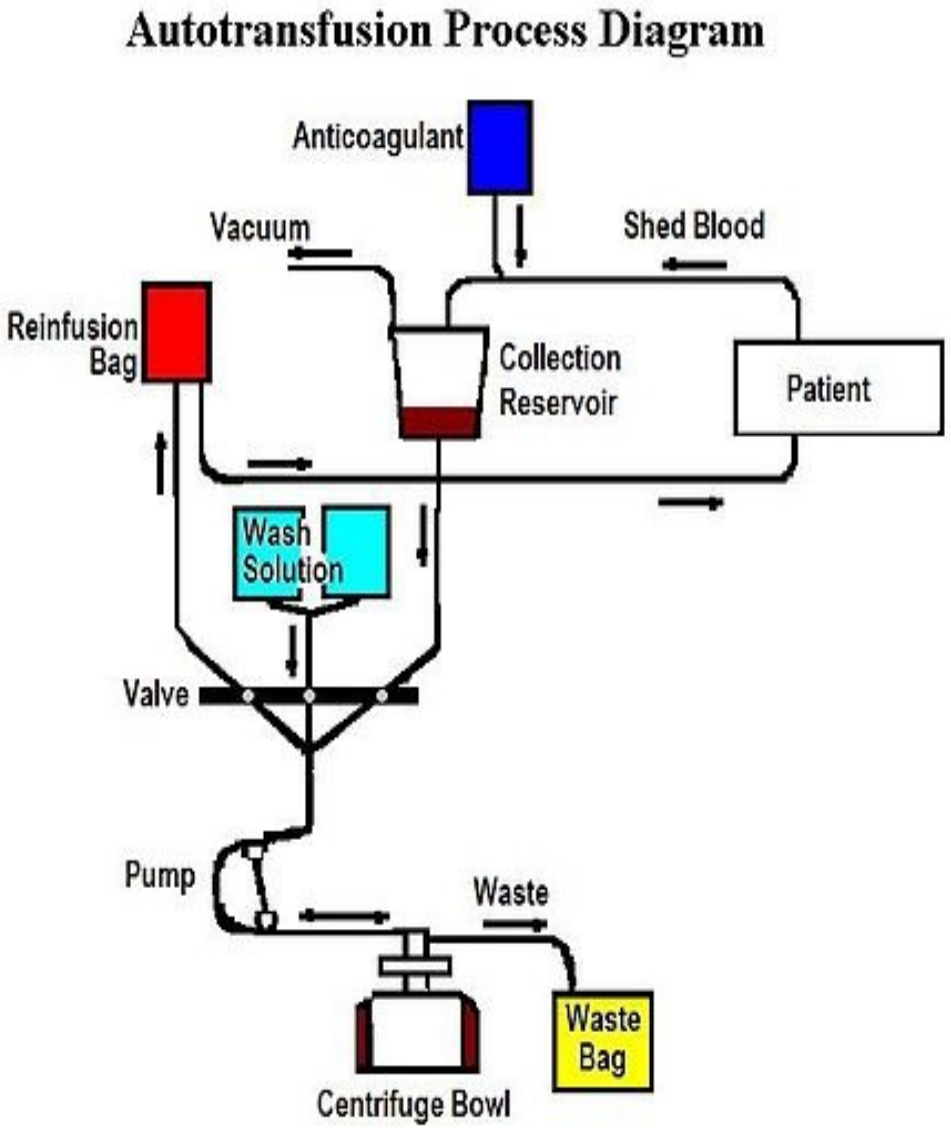
Requirements for group and screen samples and cross-matching

Blood product specification in pregnancy and the puerperium

5. ABO-, rhesus D- (RhD-) and K- (Kell-) compatible red cell units should be transfused.
6. If clinically significant red cell antibodies are present, then blood negative for the relevant antigen should be cross-matched before transfusion.
7. Cytomegalovirus- (CMV-) sero-negative red cell and platelet components should be provided for elective transfusions during pregnancy.

Strategies to Minimize the Use of Banked Blood?

1. Pre-delivery autologous blood deposit is **not** recommended.
2. Intraoperative **Cell salvage** is ***recommended*** for patients where the anticipated blood loss is great enough to induce anemia or expected to exceed 20% of estimated blood volume.
3. Consent should be obtained for IOCS where possible and its use in obstetric patients should be subject to audit and monitoring.


Autotransfusion Process Diagram
Anticoagulant
Vacuum
Shed Blood
Reinfusion Bag
Collection Reservoir
Patient
Wash Solution
Valve
Pump
Waste
Waste Bag
Centrifuge Bowl

Strategies to Minimize the Use of Banked Blood?

4. Cell salvage should only be performed by multidisciplinary teams who develop regular experience of IOCS.

5. Where IOCS is used during cesarean section in RhD-negative, previously non-sensitised women and where cord blood group is confirmed as RhD positive (or unknown), a minimum dose of 1500 iu anti-D immunoglobulin should be administered following the reinfusion of salvaged red cells.

6. A maternal blood sample should be taken for estimation of feto-maternal hemorrhage 30–40 minutes after reinfusion in case more anti-D is indicated.

Management of obstetric hemorrhage with blood components

- There should be ***a clear local protocol*** on how to manage major obstetric hemorrhage.
- The protocol should be ***updated annually*** and practized in 'skills drills' to inform and train relevant personnel.
- Clinicians should familiarize themselves with ***mechanical strategies*** that can be employed to reduce postpartum blood loss.

Management of obstetric hemorrhage with blood components

When should red cells be used?

- **There are no firm criteria for initiating red cell transfusion. The decision to provide blood transfusion should be made on clinical and hematological grounds.**
- **In an extreme situation and when the blood group is unknown, group O RhD-negative red cells should be given (although they may be incompatible for patients with irregular antibodies).**
- **Staff working in obstetric units should be aware of the location of the *satellite blood fridge* (where available)* and should ensure that access is possible for blood collection.**

Management of obstetric hemorrhage with blood components

Fresh frozen plasma (FFP) and cryoprecipitate:

- FFP at a dose of (12–15 ml/kg) should be administered for every 6 units of red cells during major obstetric hemorrhage.
- Subsequent FFP transfusion should be guided by the results of clotting tests if they are available in a timely manner, aiming to maintain (PT) and (APTT) ratios at less than 1.5 x normal.

Management of obstetric hemorrhage with blood components

Fresh frozen plasma (FFP) and cryoprecipitate:

- It is essential that *regular full blood counts* and *coagulation screens* (PT, APTT and fibrinogen) are performed during the bleeding episode.
- Cryoprecipitate at a standard dose of two (5-unit pools) should be administered early in major obstetric hemorrhage.
- Subsequent cryoprecipitate transfusion should be guided by fibrinogen results, aiming to keep levels above 1.5 g/l.

Management of obstetric hemorrhage with blood components

- Cryoprecipitate is the precipitate after centrifugation of FFP
- Each unit (around 10 to 15 mL) typically provides:*

- fibrinogen 150-250 mg / half-life=100-150hrs
- Factor VIII 80-150U /half-life=12hrs
- von Willebrand factor100-150U/half-life=24hrs
- Factor XIII 50-75U / half-life= 150-300 hrs

Management of obstetric hemorrhage with blood components

Fresh frozen plasma (FFP) and cryoprecipitate:

- The FFP and cryoprecipitate should ideally be of the same group as the recipient. If unavailable, FFP of a different ABO group is acceptable providing that it does not have a high titre of anti-A or anti-B activity.
- No anti-D prophylaxis is required if a RhD-negative woman receives RhD-positive FFP or cryoprecipitate.

Management of obstetric hemorrhage with blood components

When should platelets be used?

- Aim to maintain the platelet count *above 50 x 10^3/ml* in the acutely bleeding patient. A platelet transfusion trigger of *75 x 10^3/ml* is recommended to provide a margin of safety.
- The platelets should **ideally** be group compatible. RhD-negative women should also receive RhD- negative platelets.

Special Situations

Role of near patient testing of coagulation:

- Centres that are using thrombo-elastography (TEG®, Haemonetics, Braintree, Massachusetts, USA) or rotation thrombo-elastometry (ROTEM®, Tem, Munich, Germany) for guiding blood transfusion during major obstetric hemorrhage must ensure that their transfusion algorithm protocol has been validated and that quality assurance measures are followed.

Pharmacological strategies for management of major obstetric hemorrhage

Role of recombinant factor VIIa (rFVIIa) therapy

- The use of rFVIIa may be considered as a **treatment** for life-threatening postpartum hemorrhage (PPH), but should **not** delay or be considered a **substitute** for a live-saving procedure such as embolization or surgery, or transfer to a referral center.

Recombinant factor VIIa

Clinical data	
Trade names	NovoSeven, AryoSeven
AHFS/Drugs.com	Multum Consumer Information
Pregnancy category	US: C (Risk not ruled out)
Routes of administration	Intravenous injection
ATC code	B02BD05 (WHO)
Legal status	
Legal status	US: ℞-only
Identifiers	
ChemSpider	none

Pharmacological strategies for management of major obstetric hemorrhage

Role of fibrinogen concentrate therapy:

- Fibrinogen concentrate is **not** licensed in the UK for the management of acquired bleeding disorders. Thus, its use in PPH should be considered only in the context of clinical trials.

CSL Behring — **Fibrinogen Concentrate (Human) RiaSTAP™**

In USA

HIGHLIGHTS OF PRESCRIBING INFORMATION
These highlights do not include all the information needed to use RiaSTAP safely and effectively. See full prescribing information for RiaSTAP.

RiaSTAP, Fibrinogen Concentrate (Human)
For Intravenous Use, Lyophilized Powder for Reconstitution
Initial U.S. Approval: 2009

----------INDICATIONS AND USAGE----------
RiaSTAP, Fibrinogen Concentrate (Human) is indicated for the treatment of acute bleeding episodes in patients with congenital fibrinogen deficiency, including afibrinogenemia and hypofibrinogenemia (1).
RiaSTAP is not indicated for dysfibrinogenemia.

----------DOSAGE AND ADMINISTRATION----------
For intravenous use only. Reconstitute prior to use.
Should be administered under the supervision of a physician.

- Dose (mg/kg body weight) =
  [Target level (mg/dL) - measured level (mg/dL)]
  1.7 (mg/dL per mg/kg body weight)
- Dose when fibrinogen level is unknown: 70 mg/kg body weight (2.1).
- Monitoring of patient's fibrinogen level is recommended during treatment. A target fibrinogen level of 100 mg/dL should be maintained until hemostasis is obtained.
- The injection rate should not exceed 5 mL per minute (2.3).

Pharmacological strategies for management of major obstetric hemorrhage

Role of antifibrinolytics

- The CRASH-2 study showed that tranexamic acid reduces mortality in bleeding trauma patients without an increase in the rate of venous thromboembolism.
- For those centers not participating in clinical trials, consideration should be given to using tranexamic acid during major obstetric hemorrhage.

Management of intra-partum anemia

- In addition to major hemorrhage guidelines, obstetric units should have guidelines on criteria for red cell transfusion in anemic women who are **not** actively bleeding.
- If the *Hb is less than 70 g/l* in labor or in the immediate postpartum period, the decision to transfuse should be made according to the individual's medical history and symptoms.

Management of post-partum anemia

- If the Hb is less than 70 g/l in the postnatal period, where there is no ongoing or threat of bleeding, the decision to transfuse should be made on an informed individual basis.

Management of women who decline blood products

1. Hb should be optimized prior to delivery to prevent avoidable anemia.
2. Consent/refusal of blood and components or other transfusion-sparing techniques should be discussed and documented during the antenatal period.
3. Use of pharmacological, mechanical and surgical procedures to avert the use of banked blood and blood components should be considered early.
4. IOCS has a role in the management of patients who refuse allogeneic blood transfusion.

References

Royal College of Obstetricians & Gynaecologists

Blood Transfusion in Obstetrics

Green-top Guideline No. 47

May 2015

Shakur *et al. Trials* 2010, **11**:40
http://www.trialsjournal.com/content/11/1/40

TRIALS

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

Haleema Shakur*[1], Diana Elbourne[4], Metin Gülmezoglu[2], Zarko Alfirevic[3], Carine Ronsmans[5], Elizabeth Allen[4] and Ian Roberts[1]

National Library of Medicine PMC National Institutes of Health

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Blood transfusion practices in obstetric anaesthesia

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Abstract

Blood transfusion is an essential component of emergency obstetric care and appropriate blood transfusion significantly reduces maternal mortality. Obstetric haemorrhage, especially postpartum haemorrhage, remains one of the major causes of massive haemorrhage and a prime cause of maternal mortality. Blood loss and assessment of its correct requirement are difficult in pregnancy due to physiological changes and comorbid conditions. Many guidelines have been used to assess the requirement and transfusion of blood and its components. Infrastructural, economic, social and religious constraints in blood banking and donation are key

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CALIFORNIA MATERNAL QUALITY CARE COLLABORATIVE

Obstetric Hemorrhage: New Strategies, New Protocol

Guidelines for the Use of Iron Supplements to Prevent and Treat Iron Deficiency Anemia

Rebecca J. Stoltzfus
Michele L. Dreyfuss

International Nutritional Anemia Consultative Group (INACG)

Thank you