Postpartum hemorrhage

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Class of haemorrhagic shock				
	I	II	III	IV
Blood loss (mL)	Up to 750	750–1500	1500–2000	> 2000
Blood loss (% blood volume)	Up to 15	15–30	30–40	> 40
Pulse rate (per minute)	< 100	100–120	120–140	> 140
Blood pressure	Normal	Normal	Decreased	Decreased
Pulse pressure (mm Hg)	Normal or increased	Decreased	Decreased	Decreased
Respiratory rate (per minute)	14–20	20–30	30–40	> 35
Urine output (mL/hour)	> 30	20–30	5–15	Negligible
Central nervous system/ mental status	Slightly anxious	Mildly anxious	Anxious, confused	Confused, lethargic

Table 2. Clinical Findings in Obstetric Hemorrhage [25] (Open Table in a new window)

Blood Volume Loss	Blood Pressure (systolic)	Symptoms and Signs	Degree of Shock
500-1000 mL (10-15%)	Normal	Palpitations, tachycardia, dizziness	Compensate
1000-1500 mL (15-25%)	Slight fall (80-100 mm Hg)	Weakness, tachycardia, sweating	Mild
1500-2000 mL (25-35%)	Moderate fall (70-80 mm Hg)	Restlessness, pallor, oliguria	Moderate
2000-3000 mL (35-50%)	Marked fall (50-70 mm Hg)	Collapse, air hunger, anuria	Severe

■ HR & BP → two most commonly used V/S → Dx hemorrhage

■ women → hemorrhage may not develop tachycardia or hypotension until signifi cant blood loss (>1,000 mL)

■ ***Signs of a hemorrhage*** : HR >110 beats/ minute

BP ≤ 85/45 mm Hg

Spo2 <95%

delayed capillary refi ll

U/O ↓

pallor

ratio of the heart rate over the systolic BP (HR/Sbp) is called : shock index and may be helpful

A shock index ***greater than 1*** requires immediate managemen

(lightheadedness, palpitations, confusion, syncope, fatigue, air hunger, and diaphoresis)

1- blood loss (vaginal del > 500 cc or C/S >1000cc & normal V/S)

■ angiocath (16 or 18)

■ **3.5 lit** (maximally) crystalloids

■ **O2 therapy :**

Mask : 6-8 lit/min , cannula : 2-4 lit/min

NS → reasonable solution in the labor ward setting because: (1)low cost (2) compatibility with most drugs and blood transfusions

(If large amounts (>10 L) of crystalloid are being infused, a change to LRS can be considered)

Dextrose-containing solutions, such as 5% dextrose in water or diluted NS in 5% dextrose in water, have no role in the management of PPH. Remember that the loss of 1 L of blood requires replacement with 4-5 L of crystalloid because most of the infused fluid is not retained in the intravascular space but instead shifts to the interstitial space.

Continue Blood loss(1000-1500cc) & Normal V/S &Normal Labtest:

■ second IV line → 16 or 18 (if not available → cv-line)

■ invasive monitoring ? If necessary

■ u/o

■ PPH of up to ***1500 mL*** in a ***healthy pregnant*** woman → usually be managed → ***crystalloid*** infusion alone if the cause of bleeding is arrested

⁕ A meta-analysis in the Cochrane Library comparing resuscitation with colloid solutions versus crystalloid favored the use of crystalloids with respect to mortality

⁕The NS groups had a 1% mortality rate, versus an 11% mortality rate in the colloid group

⁕ Large volumes of colloid solutions (>1000-1500 mL/d) can → ***adverse effect on hemostasis***

No colloid solution **has been demonstrated to be superior to NS**

expense and the risk of adverse effects with colloids, **crystalloid is recommended**

Given these findings → the authors recommend ***against*** the use of colloid solutions in resuscitation outside the setting of an RCT

Continue bood loss(> 1500 cc) or transfusion >2u packed cell or coagulopathy or abnormal lab test or oliguria :

- Newer studies tend to have lower transfusion rates than older studies
- to OPERATING ROOM , TXA
- Ca , inotrope

Cardiovascular collapse(severe hemorrhage , hypovolemic shock amniotic emboli)

massive transfusion:

1- PC >10 U / 24h

2- replacement > 1 blood volume /24 h

3- replacement > 50% in 4 h (2h) (adult blood volume = 70 ml/kg)

4- ≥ 150 ml /min

■ goal:

* maintain tissue perfusion & oxygenation

* stop bleeding to use surgical or other intervention

- Check these parameters early and frequently (e.g. every 30-60 minutes while massive transfusion is ongoing)

Parameters	Values to aim for
Temperature	>35 °C
Acid-base status	pH >7.2, base excess <−6, lactate <4 mmol/L
Ionised calcium (Ca)	>1.1 mmol/L
Haemoglobin (Hb)	This should not be used alone as transfusion trigger; and, should be interpreted in context with haemodynamic status, organ & tissue perfusion.
Platelet (Plt)	≥ 50 x 10^9 /L (>100 x 10^9 if head injury/ intracranial haemorrhage)
PT/APTT	≤ 1.5x of normal
Fibrinogen	≥ 1.0 g/L

First :

1- system activity

2- CBC , PT ,PTT , INR , fibrinogen ,ABG

3- TXA 1g Qh8

4- warming the patients

5- preparing ***4 U*** packed cell :

- compatible type – screen or partially cross-match
- O –
- O + if Rh+

Second :

- ***4 u (PC) , 4 u (FFP) , 1 u (Plt SD) or 10 u (RD)***
- Lab test every 30 -60 min
- 1g calcium
- if Fibrinogen < 100 mg/dl → cryopersipitate
- Platelet & cryoprecipitate (preferably compatible unless except in emergencies)

Thirth

Repeat second

If no surgical causes , fibrinogen > 150 , Plt >50000 , ABG = Nl but bleeding (+) or unstable

→ ***recombinant factor 7***

- Targets of resuscitation in the setting of massive transfusion include:

Mean arterial pressure (MAP) of 60 to 65 mm Hg

Hemoglobin 7 to 9 g/dL

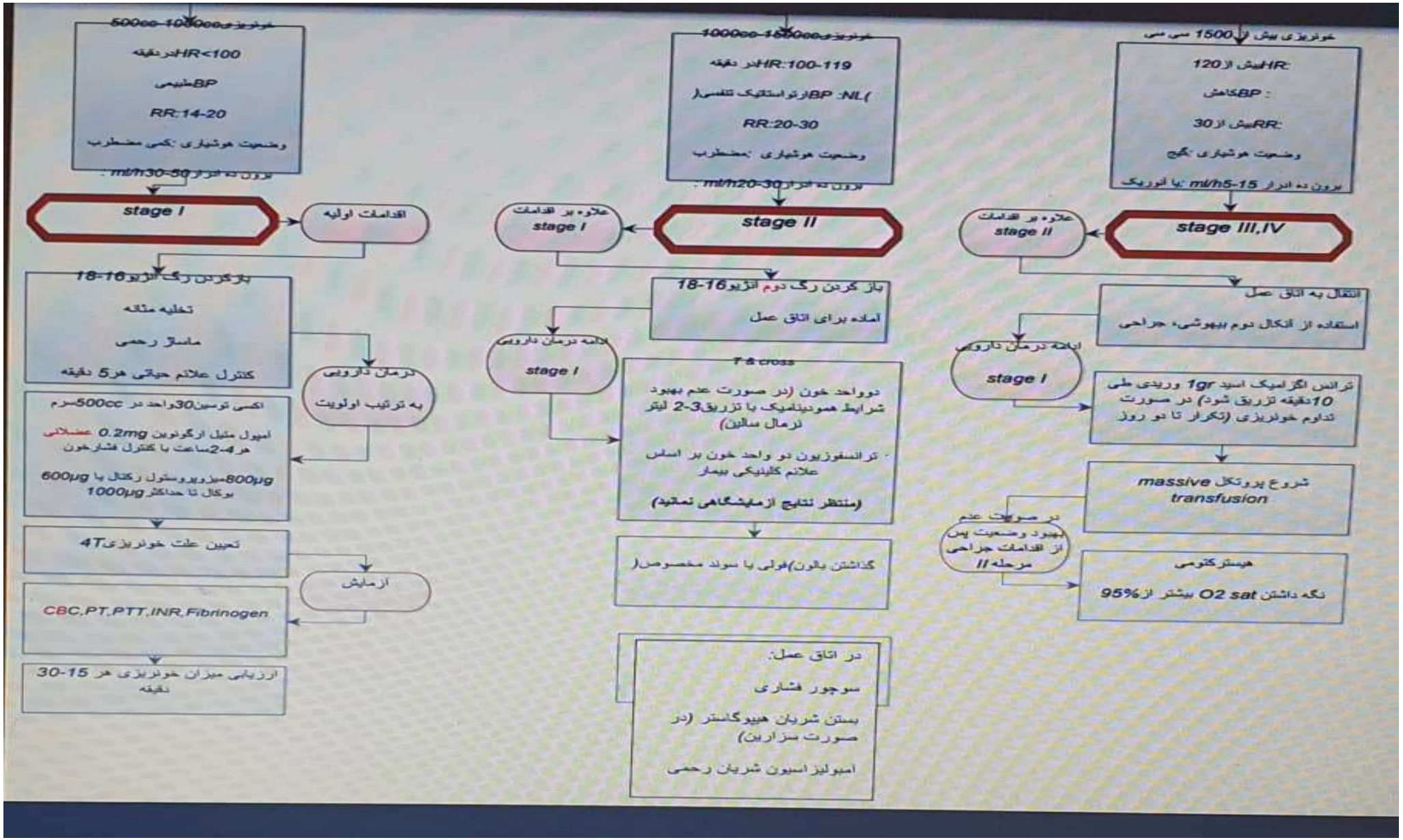
INR < 1.5

Fibrinogen > 1.5 to 2 g/L

Platelets > 50 000

pH 7.35 to 7.45

Core temperature greater than 35 C


خونریزی بیش از 1500 سی سی
HR:بیش از 120
BP:کاهش
RR:بیش از 30
وضعیت هوشیاری :گیج
برون ده ادرار ml/h5-15 :با انوریک
stage III,IV
علاوه بر اقدامات stage II
انتقال به اتاق عمل
استفاده از انکال دوم بیهوشی، جراحی
ادامه درمان دارویی stage I
ترانس اگزامیک اسید 1gr وریدی طی 10دقیقه تزریق شود) در صورت تداوم خونریزی (تکرار تا دو روز
شروع پروتکل massive transfusion
در صورت عدم بهبود وضعیت پس از اقدامات جراحی مرحله II
هیستر کتومی
نگه داشتن O2 sat بیشتر از95%
خونریزی 1000cc-1500cc
HR:100-119در دقیقه
BP :NL(ارتواستاتیک تنفسی)
RR:20-30
وضعیت هوشیاری :مضطرب
برون ده ادرار ml/h20-30 :
stage II
علاوه بر اقدامات stage I
باز کردن رگ دوم انژیو16-18
آماده برای اتاق عمل
ادامه درمان دارویی stage I
T & cross
دوواحد خون (در صورت عدم بهبود شرایط همودینامیک با تزریق3-2 لیتر نرمال سالین)
ترانسفوزیون دو واحد خون بر اساس علائم کلینیکی بیمار
(منتظر نتایج ازمایشگاهی نمانید)
گذاشتن بالون)فولی با سوند مخصوص(
در اتاق عمل:
سوچور فشاری
بستن شریان هیپوگاستر (در صورت سزارین)
امبولیزاسیون شریان رحمی
خونریزی 500cc-1000cc
HR<100در دقیقه
BPطبیعی
RR:14-20
وضعیت هوشیاری :کمی مضطرب
برون ده ادرار ml/h30-50 :
stage I
اقدامات اولیه
باز کردن رگ انژیو16-18
تخلیه مثانه
ماساژ رحمی
کنترل علائم حیاتی هر5 دقیقه
درمان دارویی به ترتیب اولویت
اکسی توسین30واحد در 500ccسرم
امپول متیل ارگونوین 0.2mg عضلانی هر4-2ساعت با کنترل فشارخون
800µg-میزوپروستول رکتال یا 600µg بوکال تا حداکثر 1000µg
ازمایش
تعیین علت خونریزی4T
CBC,PT,PTT,INR,Fibrinogen
ارزیابی میزان خونریزی هر 15-30 دقیقه

Packed cell:

1unit = 250 ml

CPDA -1 → shelf life = 35 d (< 6 ◦C)

given over 1-2 h but *not longer* than 4 h (child : 2-5 ml/kg/h)

Type – screen & cross-match

1 unit → Hb 1g/dl↑

CMV-negative or CMV reduced risk (leukocyte reduced) RBCs → ***should be used*** in pregnant women who are CMV-negative or whose CMV status is unknown.

Over time:

- Lactic acid - K - Ca ↑
- 2,3 DPG – ATP – PH – glycolysis ↓
- packed cell :
  - young : < 14 -21 d
  - old : > 21 d

FFP

■ After thawing(30-37 ◦ C) over 20-30 min → use maximally during 4h → if not → store 1-6 ◦ C → use within 24h(if no use → discarded)

■ 200 – 300 ml/h

■ ABO compatible but need no crossmatch, no (leak – clot – abnormal color)

■ Once thawed → activity of clotting factors, particularly V ,VIII → decline gradually →re-administration may → every 6 to 8 hours if there is ongoing bleeding due to the short half-life of factor VII; VII has a half-life of 2 to 6 hours

■ 10-20 mL/kg will increase factor levels by 20-30%

Platelet:

■ pool of 6 whole blood derived (→ referred : random donor) platelets or one apheresis platelet

* Random donor : 1 unit → 5000 – 10000 ↑
* single donor(apheresis) → 30000 -60000 ↑

■ room T (22 ◦ C) → RD : viable → 5-7 d

■ Thrombocytopenia :

* procedures > 50,000
* CNS & Retina > 100,000
* neuroaxial > 80,000
* LP >40,000

Contraindication :

TTP , HUS , HIT

If ABO identical platelets : *not available* → ABO plasma compatible may be use → but will not cause clinically significant problems

ABO incompatible platelets → only minimal risk of hemolysis*(unless large doses of ABO incompatible platelets are transfused)*

Rh : should be compatible

Pregnancy:

CMV-seronegative or CMV reduced risk (leukocyte reduced) platelets should be used in pregnant women who are CMV-seronegative or whose CMV status is unknown.

Cryopercipitate:

- prepared from plasma
- fibrinogen , VIII , XIII, von Willebrand factor , fibronectin
- main indication : ***hyfibrinogenemia***

*Cryo **should not** be used for patients with **Hemophilia A** (Factor VIII deficiency) **unless** recombinant and/or virally inactivated factor VIII preparations are not available.*

*It **should not** be used for patients with **von Willebrand disease** **unless** they are proven not to respond to DDAVP.*

*It is **not usually** given for **Factor XIII deficiency**, as there are virus-inactivated concentrates of this protein available.*

*Cryo is sometimes useful if **platelet dysfunction** associated with **renal failure** does not respond to dialysis or DDAVP.*

*Use for **fibrin glue***

Fibrinogen Replacement:

■ 1 unit of cryo per 5kg → ***will increase*** fibrinogen by about 100 mg/dL

Number of bags = 0.2 x weight (kg) → provide about 100mg/dL fibrinogen

Many institutions use a standard dose of ***10 units*** and then repeat if needed

■ 1unit of cryo has low volume , ***ABO compatibility is not required*** except in **neonates & small children** unless **high volumes** of cryo are to be transfused

- *Each unit (~10-15mL) provides:*
- ***Fibrinogen*** *150-250 mg with a half-life of 100-150 hours*
- ***Factor VIII*** *80-150 U with a half-life of 12 hours*
- ***Von Willebrand factor*** *100-150 U with a half-life of 24 hours*
- ***Factor XIII*** *(13) 50-75 U with a half-life of 150-300 hours*
- *Cryo also contains* ***fibronectin;*** *however there are no clear indications for fibronectin replacement*

Acute hemolytic reactions:

■ ***Early signs :*** may *fever*, *hypotension*, *flushing*, *wheezing*, *anxiety*, and/or *red-colored urine*

■ ***Late signs :*** may a generalized bleeding tendency *(DIC)* and/or *hypotension*

Nonhemolytic febrile reactions :

■ ***fever*** (some times :shaking, chills, hypotension, and vomiting)

Allergic reaction :

■ maculopapular rash and/or urticaria

■ Anaphylactic reaction :

Dyspnea, Wheezing ,Anxiety , Hypotension without fever ,Bronchospasm in severe cases

Transfusion-related acute lung injury (TRALI):

■ rapid onset of ***shortness of breath***, hypoxemia, and rales, without signs of acute cardiogenic pulmonary edema and fever during 6 h of transfusion

Or late as 6-72h sfter transfusion

Circulatory (volume) overload :

■ Shortness of breath , Rales ,Orthopnea , Tachycardia , Distended jugular veins ,Other evidence of cardiac decompensation

Acute hemolytic reactions (ABO incompatibility) :

Accidental transfusion of RBCs of a ***different ABO type***

Febrile non- hemolytic reaction:

Cytokines and other normal constituents of **leukocytes**, **platelets**, or **plasma** accumulate in blood components during storage

When transfused → some recipients → which *fever* is the ***most common*** symptom.

Allergic reaction

recipient was exposed → foreign substance in the blood product to which the recipient is sensitized.

Studies in the medical literature sugg → causes of allergic reactions → ***polymorphic proteins*** in the donors' plasma

food (nuts, tomatoes), or ***medications (penicillin)*** → donor ingested immediately before collection

Anaphylactic reaction:

M***ost cases*** of anaphylaxis ar → recipients with ***IgA deficiency*** → developed ***anti-IgA***

(Not all IgA-deficient persons)

Similar reactions in ahaptoglobinemia → reported

Transfusion-related acute lung injury (TRALI):

Neutrophils → effector cells → adhere to the ***pulmonary endothelium*** → permeability↑ → pulmonary edema

Elements → activation → neutrophils:

transfused human leukocyte or neutrophil antigen **(HLA or HNA)** antibodies and transfused bioactive substances such as lipids or cytokines

Because pregnancy → ***common cause of alloimmunization*** → HLAs and HNAs →

most cases of TRALI have been traced to plasma-containing blood components collected from female blood donors

When the American Red Cross converted to predominantly male-donated plasma, the number of cases of TRALI decreased very significantly from 2006 to 2008

Circulatory (volume) overload

Increased fluid volume →

susceptible patients→ cardiovascular compromise, elderly patients, and small children→pulmonary edema

A usual **transfusion rate** is *2-2.5 mL/kg per hour* → In at-risk patients, blood products can be transfused at a ***slower rate.***

Lab studies:

acute hemolytic reactions : the workup includes :

Visual inspection of the recipient's plasma and urine

Retyping of donor and recipient red blood cells (RBCs)

Direct antiglobulin (Coombs) testing

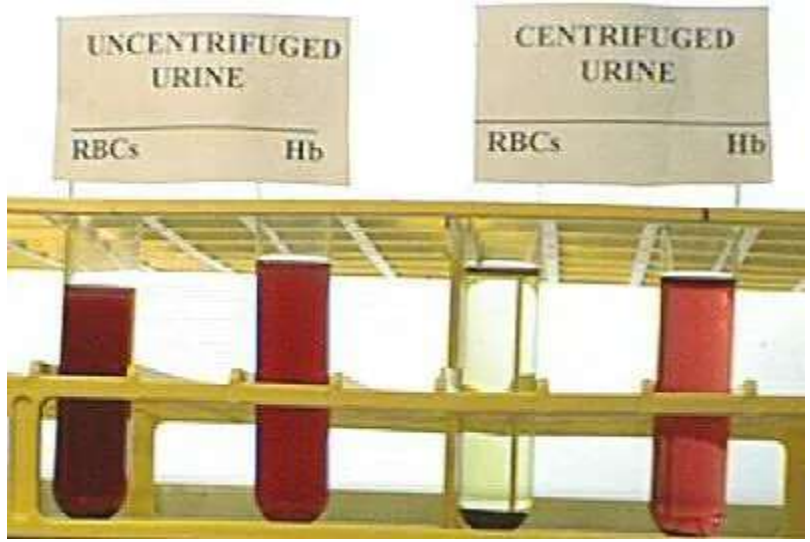
febrile nonhemolytic reactions :

Every things normal

Allergic reaction :

Every things normal

Eo may not increase



Anaphylactic reaction:

anti-IgA in a pretransfusion sample of the recipient's serum or plasma establishes the diagnosis

Transfusion-related acute lung injury (TRALI):

plasma levels of brain natriuretic peptide (BNP) may be useful in distinguishing the cardiogenic pulmonary edema present in circulatory overload from the noncardiogenic pulmonary edema present in TRALI

Acute hemolytic reactions:

■ Immediate ***DC*** *transfusion* while maintaining IV_ LINEs for emergency management.

■ Anticipate hypotension, renal failure, and DIC.

■ Prophylactic → reduce the risk of ***renal failure*** may include ***low-dose dopamine*** (1-5 mcg/kg/min)

Maintain U/O minimally → *75-100 ml/h*

* ***vigorous hydration*** with crystalloid solutions (3000 mL/m^2/24 h)
* If fluid and mannitol → ineffective → ***furosemide***
* *urine alkalization* → bicarb

((osmotic diuresis with 20% mannitol (100 mL/m^2/bolus, followed by 30 mL/m^2/h for 12 h).))

If DIC is documented and bleeding requires treatment, ***transfusions of frozen plasma***, ***pooled cryoprecipitates*** for fibrinogen, and/or *platelet* concentrates may be indicated.

Febrile, nonhemolytic reactions

fever usually *resolves* in **15-30 minutes** without specific treatment

If fever → discomfort → oral ***acetaminophen*** (**325-500 mg**)

Avoid ***aspirin*** because of its prolonged adverse effect on platelet function

Allergic reactions

diphenhydramine → effective → *pruritus* that is associated with ***hives or a rash***

(oral or IV) 25 -100 mg

Anaphylactic reactions

SQ injection of ***Epinephrine*** (**0.3-0.5 mL of a 1:1000**) is standard treatment

If patient → sufficiently hypotensive → efficacy of the subcutaneous route?

Epinephrine (**0.5 mL of a 1:10,000 aqueous solution**) → IV

Although ***no documented*** evidence exists that *IV corticosteroids* are beneficial

most clinicians → hydrocortisone or prednisolone if an immediate response to epinephrine does not occur.

Transfusion-related acute lung injury (TRALI) :

1- *Immediately discontinue* → transfusion while preserving ***venous access IVs***

2- ***mild episodes*** → respond to ***oxygen*** administered by *nasal* catheter or *mask*

If ***shortness*** of breath *persists after oxygen* administrationt → ransfer to an IC where ***mechanical ventilation*** can be employed.

3- In the absence of signs of acute volume overload or cardiogenic pulmonary edema *diuretics are not indicated.*

No evidence → corticosteroids or antihistamines are beneficial.

Treat complications with specific supportive measures.

Circulatory (volume) overload :

1- ***sitting position*** and administer ***oxygen*** to facilitate breathing.

2- The *most specific* treatment is *discontinuing the transfusion* and removing the excessive fluid.

3- If practical, the unit of blood component being transfused may be lowered to reverse the flow and to decrease intravascular volume by a controlled phlebotomy.

3- Less urgent situations may be managed by a ***parenteral or oral diuretic (furosemide).***