Transfusion Therapy

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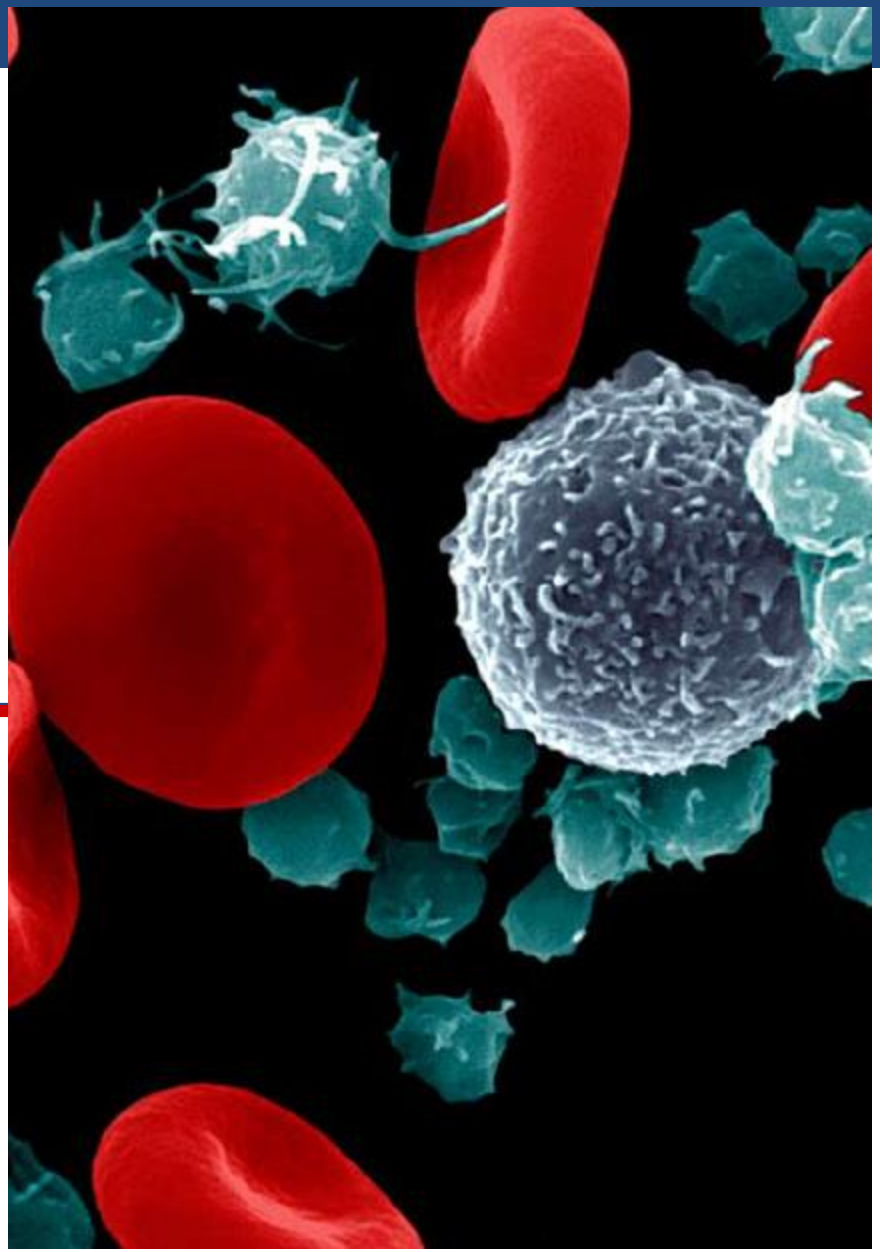


Definitions

Blood product; any therapeutic substance prepared from human blood.

Whole blood; unseparated blood collected into an approved container containing an anticoagulant preservative solution.

Blood component;

1. A constituent of blood , separated from whole blood such as

- ✓ Red cell concentrate
- ✓ Plasma
- ✓ Platelet concentrates

2. Plasma or platelets collected by apheresis
3. Cryoprecipitate prepared from fresh frozen plasma

Contents of a bag of donor blood

- Anticoagulants
  - Citrate
  - Heparin
- Preservatives
  - Citrate
  - Adenine
  - Dextrose

Blood Components

It is preferable to give the patient the specific portion of the blood required rather than whole blood:

- red cells for oxygen-carrying capacity,
- plasma for coagulation proteins,
- platelets for microvascular bleeding.
- WBCs; infections

Whole Blood

- A unit of whole blood is collected in CPDA-1 anticoagulant giving it:

✓ a shelf –life of 35 days

✓ a volume of 510 ml (450 ml of blood plus 63 ml of CPDA-1).

- Whole blood is indicated in the management of :-

✓trauma

✓ surgical cases involving extensive blood loss.

What are the advantages of whole blood?

1- It provides colloid osmotic pressure and some coagulation factors.

2- It does not expose the recipient to RBCs and plasma from different donors.

- ✓ Amount to be transfused: 15- 20 ml/kg.
- ✓ Each 6 ml/kg raises the Hb by 1 gm.

Red Blood Cells

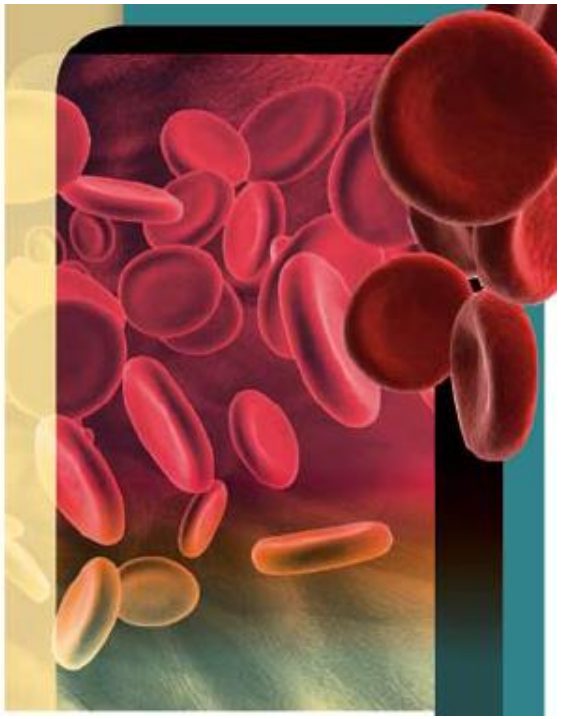
Packed RBCs are the products of choice for

- ✓ the correction of an isolated defect in oxygen- carrying capacity, as in chronic anemia.

- ✓ patients with cardiovascular compromise.

Amount

- ➢ Amount to be transfused:10-15 ml/ kg
- ➢ Each 4ml/ kg raises Hb by 1 gm



Leukocyte- Reduced Red Cells

What are the main indications for LRRCs?

- Prevention of non-hemolytic febrile transfusion reactions.
- Prevention of alloimmunization to HLA antigens that can prevent post- transfusion platelets increments, such as in cancer patients undergoing chemotherapy.

Washed Red Cells

- RBCs are washed using isotonic saline solutions, by either automated or manual techniques.
- The resulting product must be transfused within 24 hours.
- The primary aim of washing is to remove plasma proteins, although some leukocytes and platelets are removed.
- Indication:

  prevention of severe allergic transfusion reactions.

Indications of Blood Transfusion

I-Intrauterine Transfusion

- Is indicated to correct fetal anemia caused by red cell alloimmunization (Rh. Incompatibility)

II- Neonatal Transfusion

Exchange Transfusion

- Indications:- Severe anemia at birth
  - Severe hyperbilirubinemia.

Red Cell Transfusion

✓ acute blood loss of >10% blood volume;

✓hemoglobin less than 8 g/dl in a stable newborn with symptoms of anemia

✓hemoglobin less than 12 g/dl in an infant with respiratory distress syndrome or congenital heart disease.

III-Transfusion Support for Children with Hemoglobinopathies

- **These children are**:
- frequently transfused,
- possible future candidates for stem cell transplantation **(SCT).**

- All children on regular transfusion should be vaccinated against hepatitis B.

- Children with chronic anemias including aplastic anemia should have extended red cell phenotype (Rh and Kell) prior to regular transfusions.

-The rate of transfusion of red cell products is 5 ml /kg/ h.

IV- Transfusion support for HSCT, aplastic anemia & malignancies

Red Cells

- All children with aplastic anemia, or who are being treated with chemotherapy&/ radiotherapy may become candidates for **SCT.**
- For children with bone marrow aplasia; RBC concentrates are reserved for symptomatic patients with Hb < 7 g/dl.
- Irradiation of blood products should be considered before and during conditioning for all types of **SCT**.

V- Acute blood loss

- The need for transfusion is based on estimation of lost circulating blood volume and hemoglobin concentration.

➢ Acute loss of > 25% of circulating blood volume

Types of transfusion therapy in SCD

- **Intermittent simple transfusion**
  - Blood given on an “as needed” basis
- **Chronic simple transfusion[1]**
  - Transfusions administered regularly, usually every 3–4 weeks
- **Exchange transfusion[2]**
  - Removal and administration of multiple units of blood, usually about every 4 weeks
    - Manual
    - Automated

[1]Adams RJ, *et al*. *N Engl J Med*. 1998;339:5–11;
[2]Cabibbo S, *et al*. *Transfus Apheresis Sci*. 2005;21:315–321

Acute vs Chronic Transfusion

Acute: simple or exchange

Acute exacerbation of baseline anemia

1. Aplastic crisis
2. Splenic sequestration
3. Hepatic sequestration
4. Hyperhemolysis

Severe vaso-occlusive events

1. Acute chest syndrome
2. Stroke
3. Severe infection
4. Acute multi-organ failure syndrome

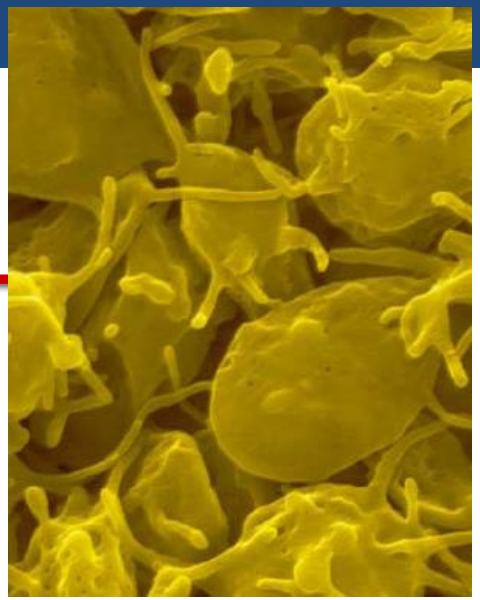
Preparation for procedures

1. General anesthesia and surgery
2. Radiographs with ionic contrast

Chronic Transfusion Therapy

Indications: **Stroke**

Platelets Transfusion



- Platelets: derived from Whole Blood; should contain ≥5.5 x 10^{10} platelets

- Anticoagulant is the same as used for the whole blood collection.

- Rh-negative recipients should receive Rh-negative platelets when possible.

- Platelet viability is optimal at 22° C but storage is limited to 4-5 days.

Indications

- Acute Leukemia and following High Dose Chemotherapy
- Chemotherapy for Solid Tumors
- Immune Thrombocytopenic Purpura (ITP):

a) Patients with major, life-threatening bleeding or intraoperative hemorrhage.

b) Prophylactic transfusions are usually inappropriate since transfused platelets do not survive any longer than patients' native platelets.

c) Transfusion may be considered before elective splenectomy with platelet counts ≤10,000/mm3.

- Aplastic Anemia:

Transfuse stable patients prophylactically at counts ≤5,000/mm³ and patients with fever or minor hemorrhage at counts 6,000-10,000/mm³.

- PLT at any count, but with PLT dysfunction plus bleeding or an invasive procedure.

Dosing:

- Transfusion of 10 ml/kg, it increase plt 10.000.

- Response to platelet transfusion is adversely affected by the presence of fever, sepsis, splenomegaly, severe bleeding, consumptive coagulopathy, HLA alloimmunization

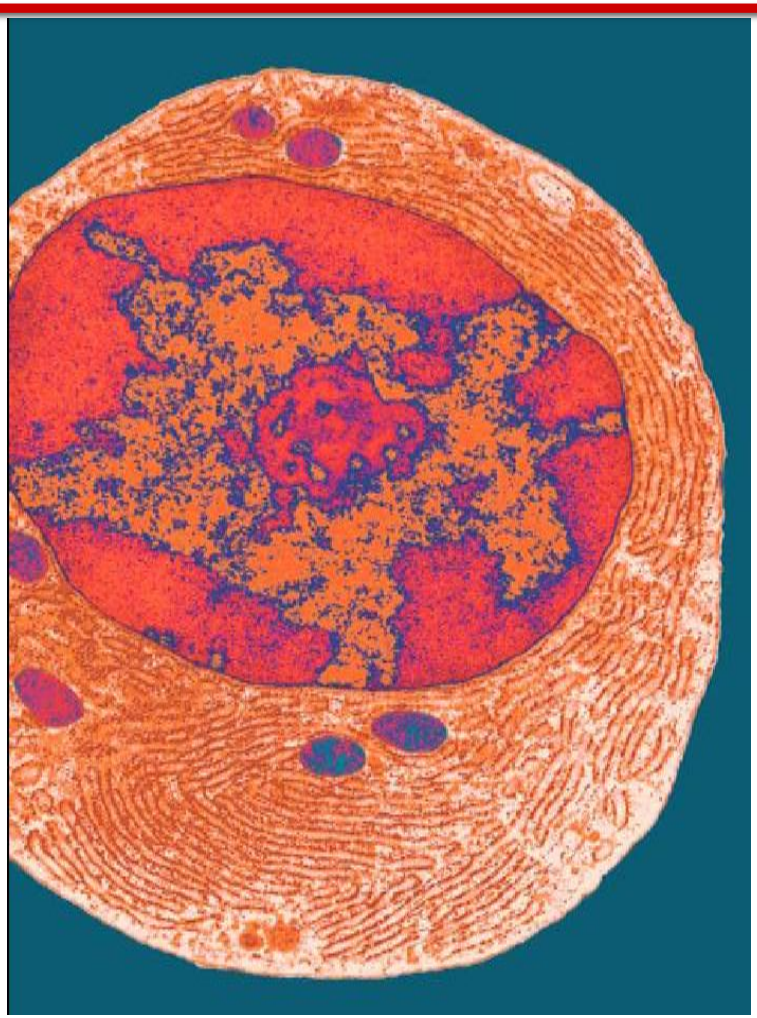
Frozen Plasma (FFP)

- Plasma consists of the non-cellular portion of blood that is separated & frozen after donation.

- It may be prepared from whole blood or collected by apheresis.

- The volume of the unit is approximately 250 ml.

- FFP is frozen at -18C or colder within 6-8 h of collection



FFP contains

- ✓ Proteins – Fibrinogen, vWF, protein C & S,
- ✓ and soluble clotting factors (V,VII,IX,XI)

- ❑ FFP must be thawed, usually in a water bath, and infused immediately or stored at 1-6^{o}C for up to 24 hours.
- ❑ Dose : 15 ml/kg.

Indications

1. Active bleeding or risk of bleeding due to deficiency of multiple coagulation factors.

2. Bleeding or prophylaxis of bleeding for a known single coagulation factor deficiency for which no available concentrate.

3. Thrombotic thrombocytopenic purpura.

Frozen Plasma should not be used for

1. Increasing blood volume or albumin concentration

2. Coagulopathy that can be corrected with administration of Vitamin K.

3. Normalizing abnormal coagulation screen results, in the absence of bleeding.

Cryoprecipitate

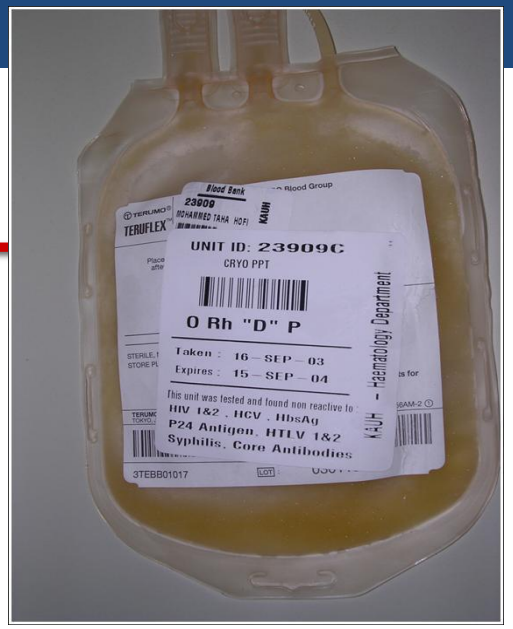
- A cryoprecipitate unit is prepared by thawing one unit of FFP between 1-6^{o}C and recovering the cold insoluble precipitate.
- The cryoprecipitate is refrozen within 1 hour.
- If the label indicates “Cryoprecipitate, Pooled,” several units of cryoprecipitate have been pooled into one bag.

Cryoprecipitate contains concentrated levels of:

Fibrinogen, Factor VIII:C, Factor VIII: vWF, Factor XIII.

Each unit of cryoprecipitate contains at least 80 IU Factor VIII:C and 150 mg of fibrinogen in 5-20mL of plasma.

Selection and Preparation:



- Compatibility testing is unnecessary.
- Rh type need not be considered.
- It is preferable to use cryoprecipitate that is ABO-compatible with the recipient's RBCs.

Dose : 1 bag/5kg or 15 ml/kg

- Cryoprecipitate is indicated for bleeding associated with fibrinogen deficiencies and Factor XIII deficiency.

Granulocyte transfusions

Guidelines:

- ✓ Neutrophils of 500 c/cmm and bacterial infection unresponsive to appropriate antimicrobial therapy.

- ✓ Qualitative neutrophil defect and infection and unresponsive to appropriate antimicrobial therapy.

Volume of blood products

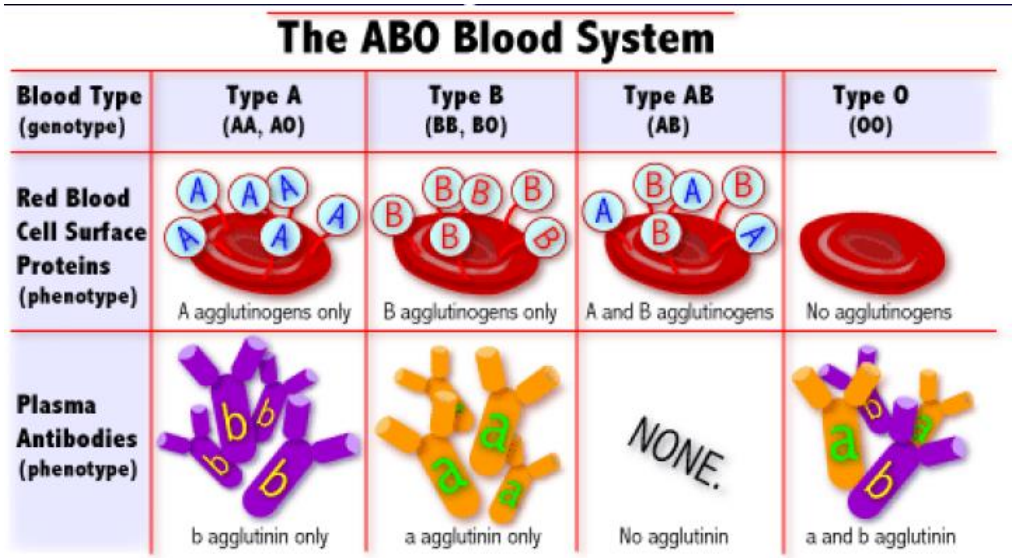
- Packed red blood cells (PRBCs): 250-350 mL per unit.
- Fresh frozen plasma (FFP): 250–300 mL per unit.
- Platelets: 40–50 mL per unit (single donor), 250-350 mL per unit (pheresis).
- Cryoprecipitate: 10–12 mL per unit.

Compatibility test (cross-match)

- Compatibility testing involves two separate procedures involving both donor and recipient blood:

1. ABO & Rh blood type identification
2. Donor/recipient cross-match

The antibody screen **(which is an indirect Coombs test)** is performed to identify recipient antibodies against RBC antigens.



Compatibility paper:

- Should compare information on blood bag and compatibility paper:

- ✓ Name
- ✓ Blood group and Rh
- ✓ Type of blood product
- ✓ NO.
- ✓ Date
- ✓ Blood compatible or not with signature of officer

Blood Bank Request

جمهورية العراق

وزارة الصحة
مديرية مستشفى

التسلسل :
العـــدد :
التاريخ :

الى/مركز نقل الدم الرئيسي
م/طلب دم

يرجى تزويدنا بالدم او احد مشتقاته للمريض الراقد في مستشفانا وحسب المعلومات المدرجة ادناه من قبل الطبيب المعالج.

اسم الطبيب الثلاثي : جنسية المريض : مدير المستشفى :
وحدة الطبية : الشعبة :
التشخيص :
العمر : السرير : رقم الملف :
عنوان سكن المريض / حي ( ) محلة ( ) زقاق ( ) رقم الدار ( )
اسم الطبيب المعالج ( ) توقيعة ( )

- ☐ PAKED RED CELLS ..... UNITS
- ☐ WHOLE BLOOD ..... UNITS
- ☐ WASHED RED CELLS ..... UNITS
- ☐ FRESH FROZEN PLAZMA ..... UNITS
- ☐ CRYOPRCLPITATE CONCETRATE ..... UNITS
- ☐ LEUCOCYTES CONCEN ..... UNITS
- ☐ PLATELETS ..... UNITS
- ☐ CRY- POOR PLAZMA ..... UNITS
- ☐ (STORED) ..... UNITS
- ☐ BLOOD GROUP & RH ..... صنف الدم
- ☐ RECENT HB and p.c.v ..... احدث دم للهيموغلوبين

ملاحظة: ١. تملأ الاستمارة بشكل كامل من قبل الطبيب المعالج وترسل الينا قبل (٢٤) ساعة على ان تتضمن توقيع المدير وختم المستشفى.
٢. ستهمل الطلبات الناقصة.
٣. يعاد الدم غير المستعمل الى مصرف دم المستشفى ويمنع بقاؤه في الردهات.

CLINICAL DETAILS

1- Reason for transfusion .....
2- Has the patient received Dextrin Recently? .....
3- Has patient received previous transfusion .....
4- If the patient is a female, please record :
   a. How many pregnancies she had (if none , state none) .....
   b. How many miscarriages before 5th month (if none , state none) .....
   c. How many stillbirths or miscarriages after 5 th month (if none , state none) .....
D. Whether any children suffered from severe jaundice or anemia in first few weeks of life .....

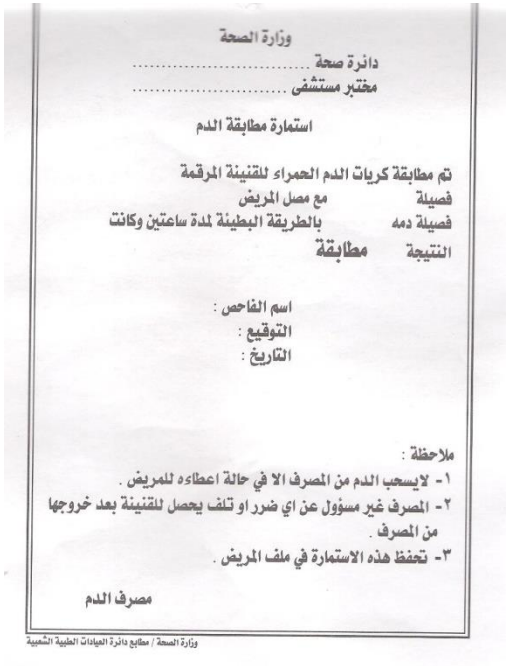
.....

FOR LABORATORY USE ONLY

patient Group	ABO / Cell		Serum	C	D	E	Others			
Bottle no.	ABO	C	D	E	Others	Cross Match			Results
						37 c	RT	AHG	

وزارة الصحة/مطابع دائرة العيادات الطبية الشعبية

- ✓ Warm the blood
- ✓Check vital signs
- ✓ Point the amount of blood according to pt. wt.
- ✓Consider diuretic in case of severe anemia & HF.
- ✓ Duration of blood transfusion(2-4)hr.



وزارة الصحة

دائرة صحة .....

مختبر مستشفى .....

استمارة مطابقة الدم

تم مطابقة كريات الدم الحمراء للقنينة المرقمة

فصيلة مع مصل المريض

فصيلة دمه بالطريقة البطيئة لمدة ساعتين وكانت

النتيجة **مطابقة**

اسم الفاحص :

التوقيع :

التاريخ :

ملاحظة :

١- لايسحب الدم من المصرف الا في حالة اعطاءه للمريض .

٢- المصرف غير مسؤول عن اي ضرر او تلف يحصل للقنينة بعد خروجها من المصرف .

٣- تحفظ هذه الاستمارة في ملف المريض .

مصرف الدم

وزارة الصحة / مطابع دائرة العيادات الطبية الشعبية

Observe for signs of blood reaction

ANY QUESTION?