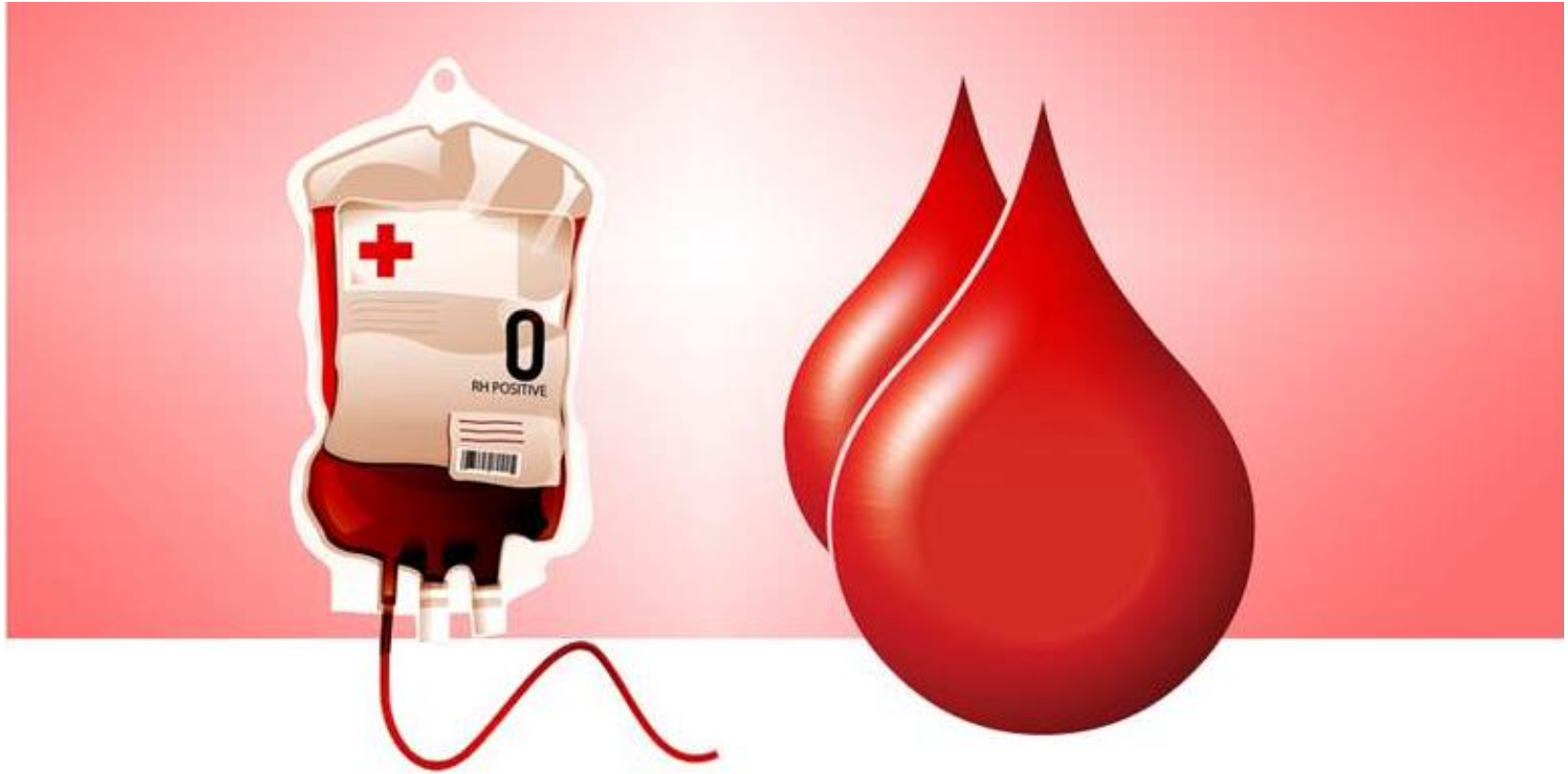


Safe Blood and Blood Products



Reni David



Objectives



- Blood component collection, preparation, and testing
- Labeling of the blood products
- Blood product & usage
- Critical steps in lab processes
- Handling of blood products in the hospital
- Blood transfusion safety
- The LIS & HIS in safe blood transfusion

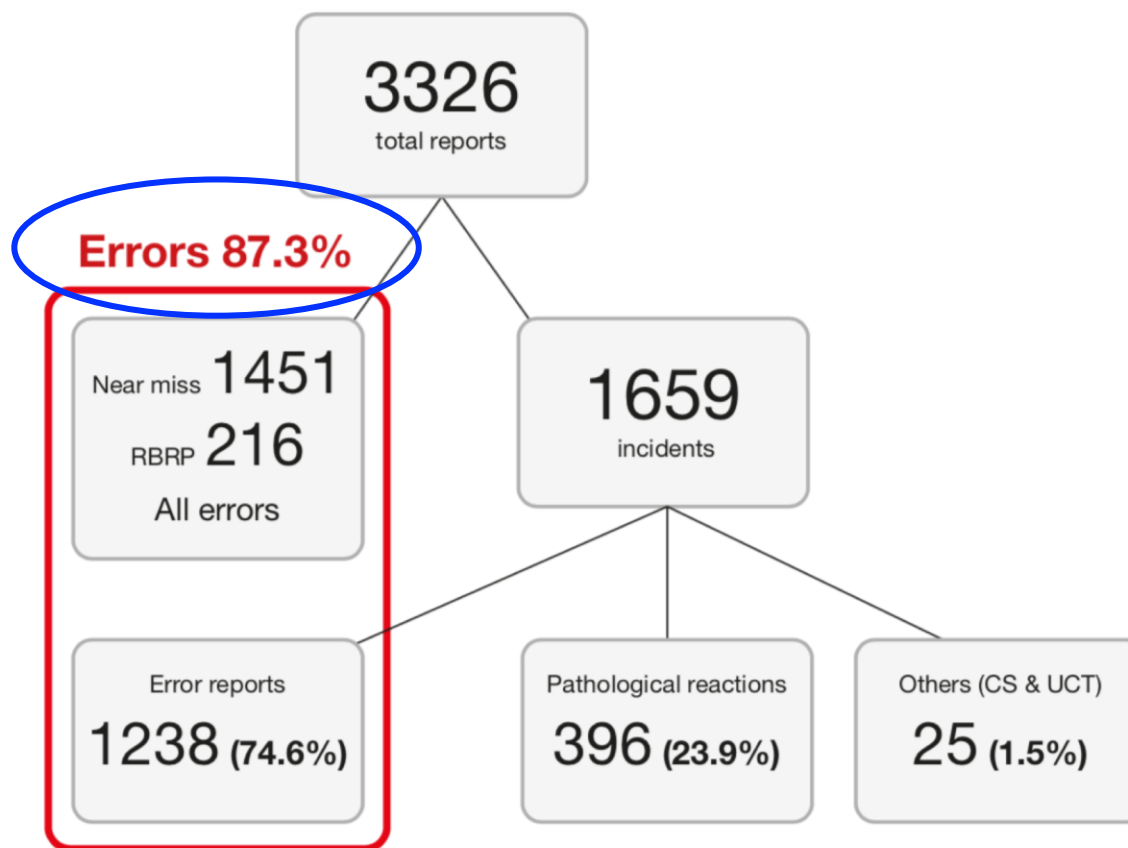
Safe Blood



Blood for transfusion is considered safe when it is:

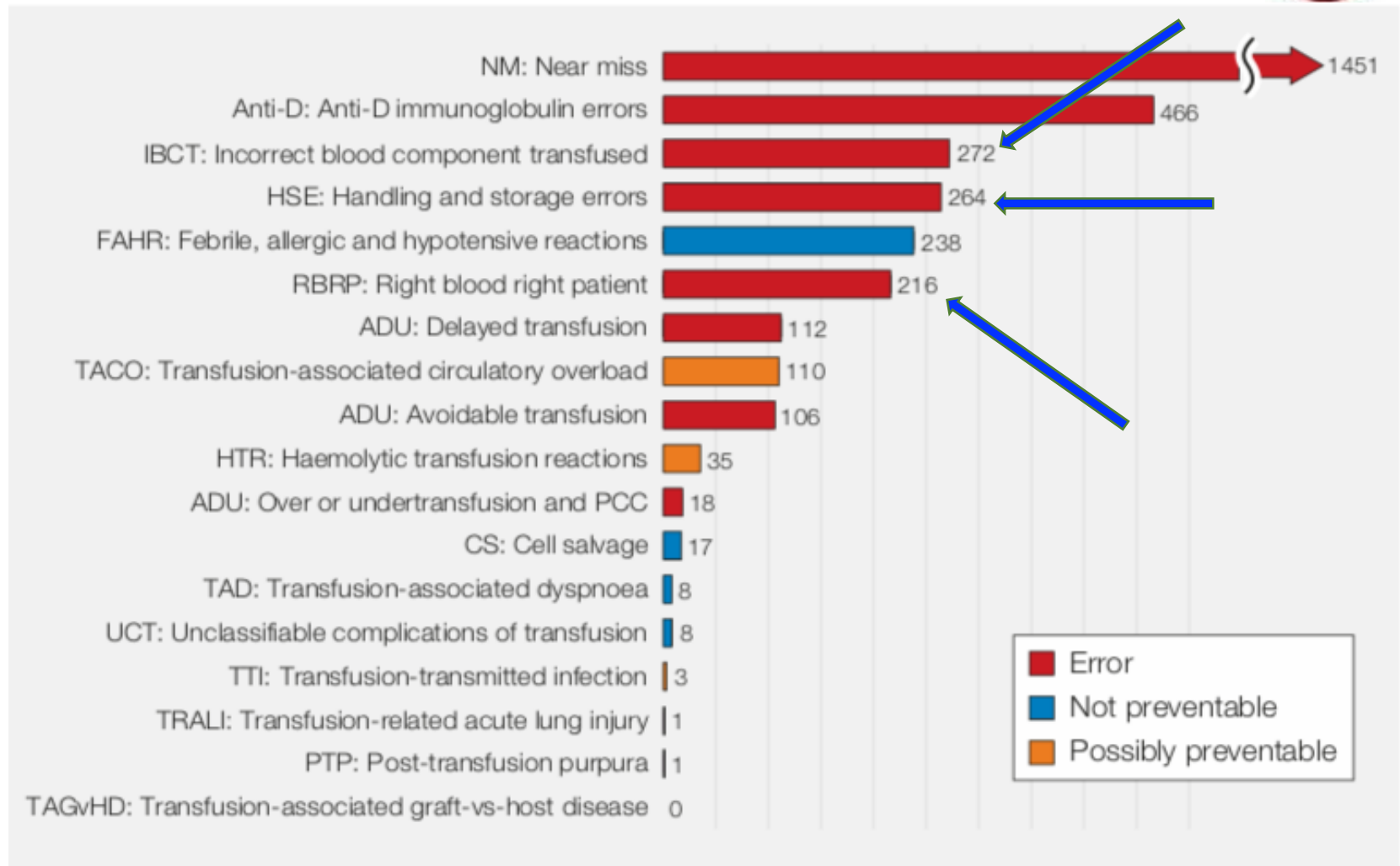
- Donated by a carefully selected, healthy donor
- Free from infections that could be harmful to the recipient
- Processed by reliable methods of testing, component production, storage and transportation
- Transfused only upon need and for the patient's health and wellbeing
- Trained staff monitor a patient undergoing transfusion and respond immediately there are signs of an adverse effect.

SHOT Report 2018



RBRP=right blood right patient; CS=cell salvage; UCT=unclassifiable complications of transfusion

Categories



Near Miss



- Two blood products were collected for two different patients at the same time from the lab and was transported in the same box
- Blood prepared in preparation room
- Nurse verified the blood in the EMR and prepared it & left it in the preparation room to answer a call bell .
- Another nurse came and prepared the second bag for a different patient and kept it on the table close to the first one
- The first nurse came back and took the second bag of blood to the patient bedside to transfuse. During dual verification and sign off the second nurse identified the error and blood not administered
- Only partial match of the blood product with the recipient was available in the EMR at that time

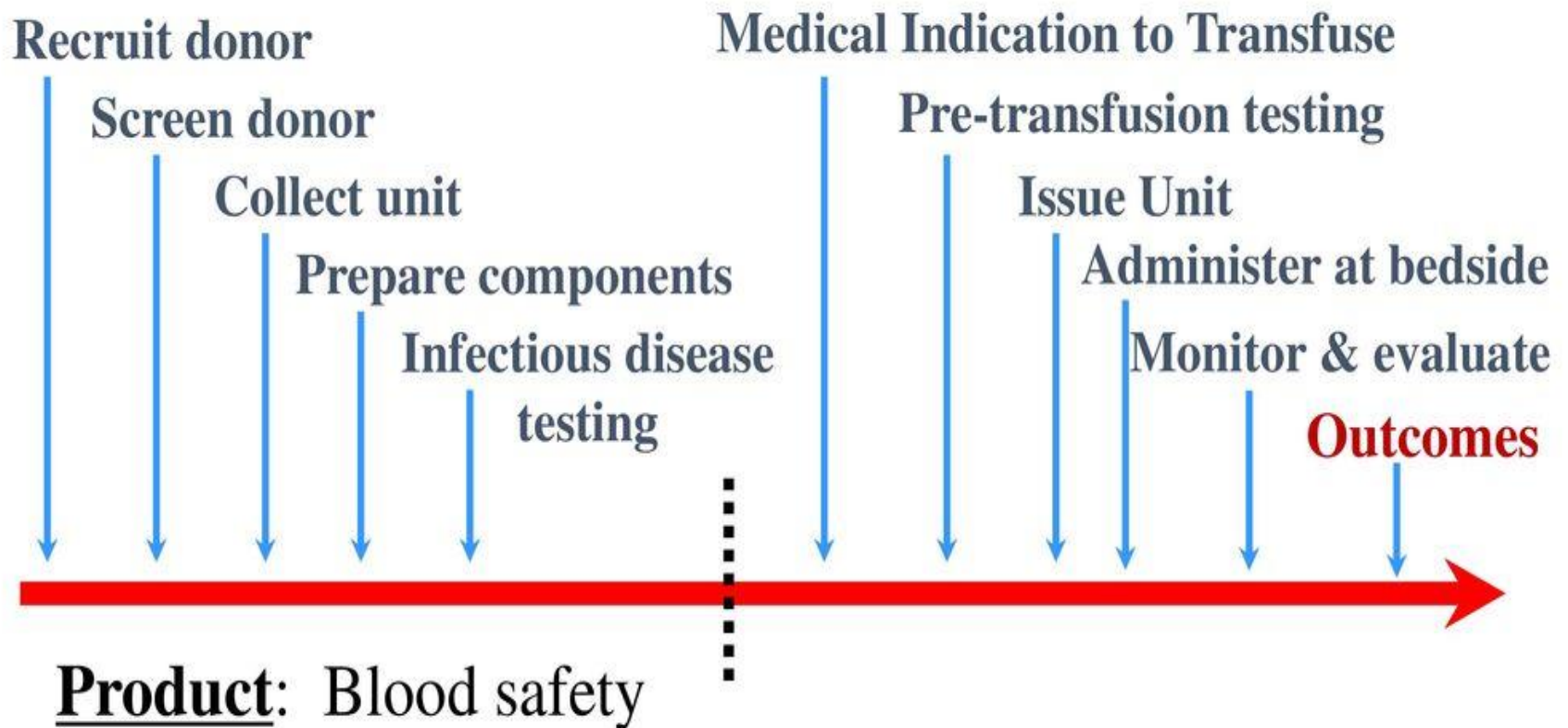
Patient safety goal



**GETTING THE RIGHT BLOOD,
TO THE RIGHT PATIENT,
EVERY TIME**



Process

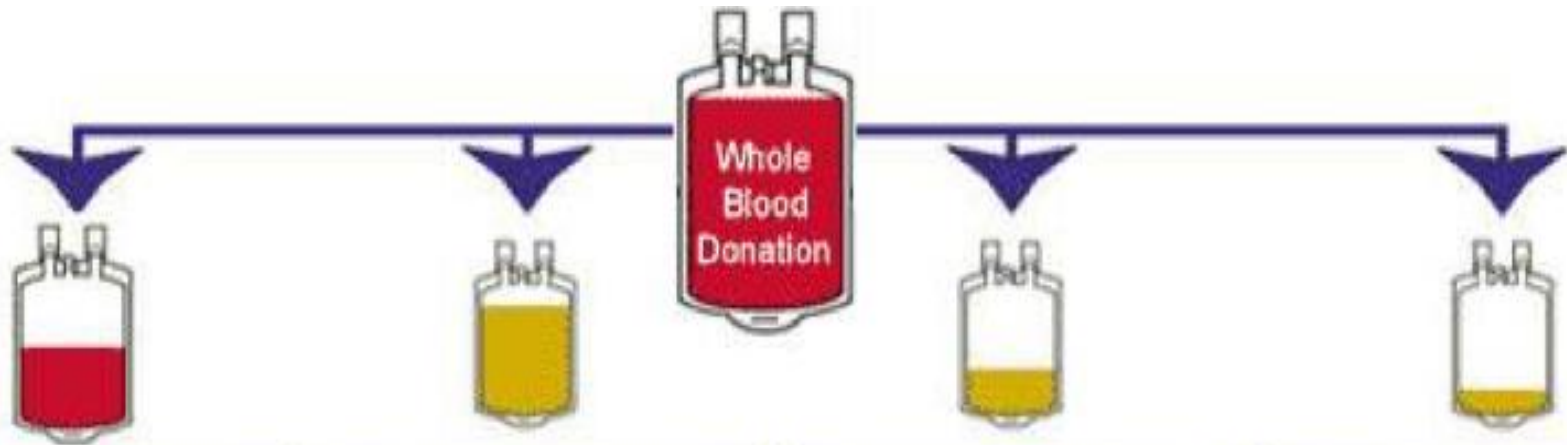


Donor



- To donate, individuals must be at least 16 years old (or the age specified by state law), healthy and feeling well on the donation day
- Donors must meet weight and hemoglobin level requirements
- Donors also are screened for disease risk factors
- Donation interval: the interval between blood donations should be 3 to 4 months
- Once collected, the blood is tested for donor blood type and screened for any clinically significant donor antibodies, prepared & stored in the lab

STORAGE



Red Blood Cells

To increase the amount of red blood cells after trauma or surgery or to treat severe anemia.

Fresh Frozen Plasma

To correct a deficiency in coagulation factors or to treat shock due to plasma loss from burns or massive bleeding.

Concentrate of Platelets

To treat or prevent bleeding due to low platelet levels. To correct functional platelet problems

Cryoprecipitate

To treat fibrinogen deficiencies:

STORAGE PERIOD

42 days in the refrigerator or 10 years in the freezer

1 year in the freezer

5 days at room temperature

1 year in the freezer

Blood Storage Devices

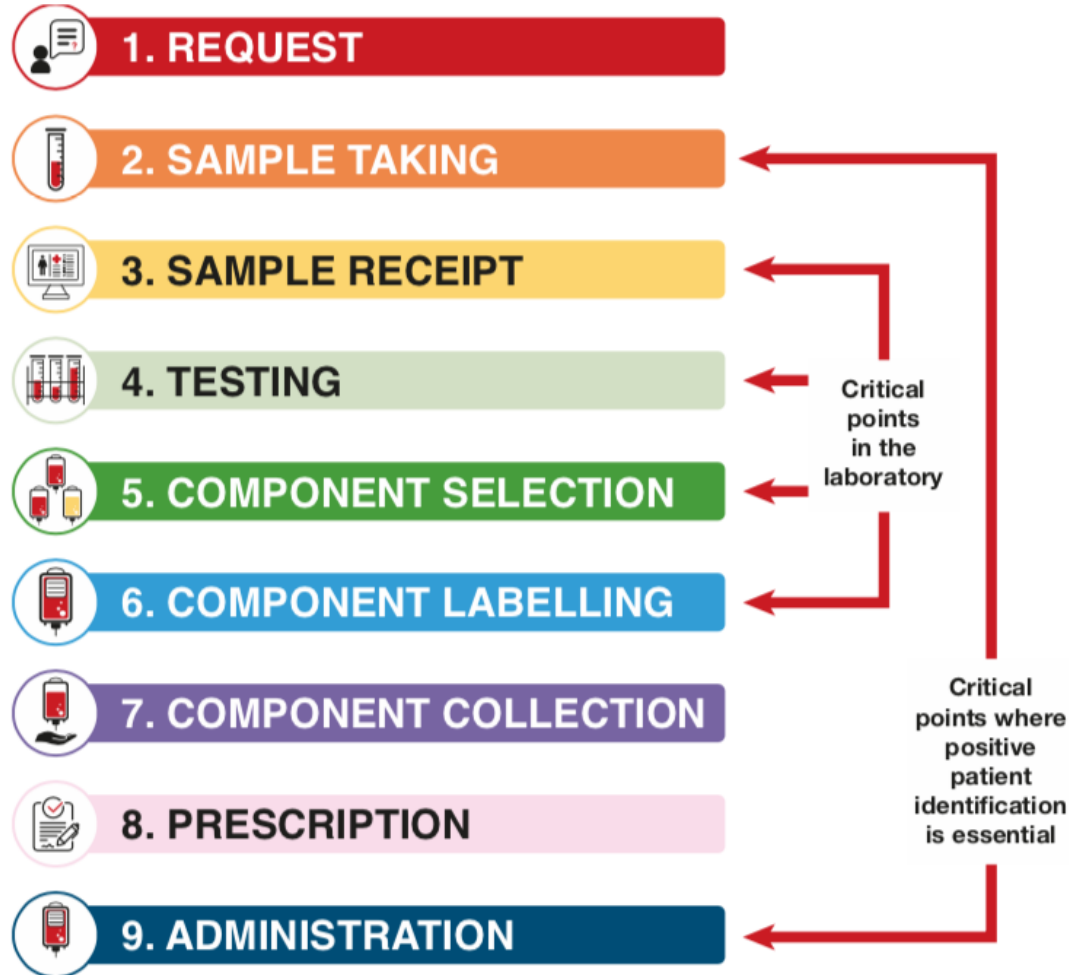
AABB standard 3.6.2



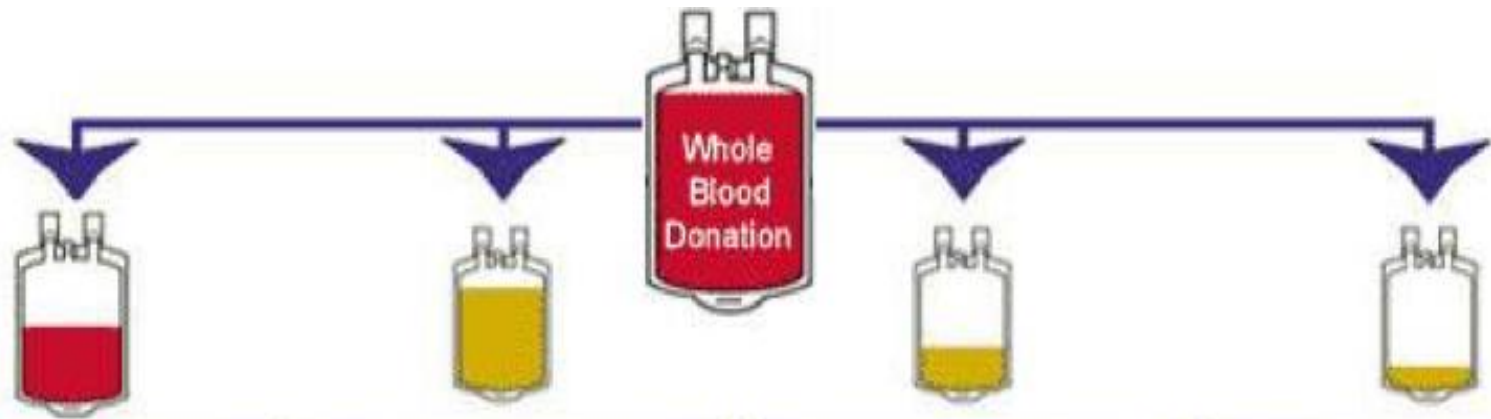
- Blood Bank Storage units shall be continuously monitored to ensure the correct temperature conditions are maintained for storage of blood and blood components, the temperature shall be monitored continuously and recorded **at least every 4 hours**.
- Continuous temperature monitoring with data loggers and active alarm system on all storage equipment's – Comark system



Critical steps in Transfusion process



Request - Correct Usage of Blood



Red Blood Cells

To increase the amount of red blood cells after trauma or surgery or to treat severe anemia.

Fresh Frozen Plasma

To correct a deficiency in coagulation factors or to treat shock due to plasma loss from burns or massive bleeding.

Concentrate of Platelets

To treat or prevent bleeding due to low platelet levels.
To correct functional platelet problems

Cryoprecipitate

To treat fibrinogen deficiencies:

Blood prepare order



Orders

Active Signed & Held Home Meds Manage Labs Order History

Sort by: Order Type Go to: Expired Orders

C-Reactive Protein Blood, Venous	Clinical Comment: If he has new fever As needed, Starting Thu 21/2/19 at 10:39, Until Thu 28/2/19, For 7 days, Timed If he has new fever	Modify Discontinue
Clostridium Difficile Toxins A & B Stool	Once, Tue 12/2/19 at 11:49, For 1 occurrence, Routine	Modify Discontinue
Procalcitonin	As needed, Starting Thu 21/2/19 at 10:39, Until Thu 28/2/19, For 7 days If he has new fever	Modify Discontinue
Stool culture	Once, Tue 12/2/19 at 11:49, For 1 occurrence Clinical Comment: perianal abscess, on multiple antibiotics.	Modify Discontinue
And		
Stool Routine	Once, Tue 12/2/19 at 11:49, For 1 occurrence	Modify Discontinue
Urea Electrolytes	Every other day, First occurrence on Sun 17/2/19 at 06:00, Last occurrence on Sat 23/2/19 at 06:00, For 8 days	Modify Discontinue
Urine culture	Once, Sat 26/1/19 at 16:32, For 1 occurrence Clinical Comment: leukaemia	Modify Discontinue
And		
Urine Routine	Once, Sat 26/1/19 at 16:32, For 1 occurrence	Modify Discontinue
Urine culture	Once, Sun 27/1/19 at 12:48, For 1 occurrence Clinical Comment: acute leukemia	Modify Discontinue
And		
Urine Routine	Once, Sun 27/1/19 at 12:48, For 1 occurrence	Modify Discontinue
Blood Bank		
Prepare RBC (Cross Match Process): 2 Units	Routine Prepare 2 Units	Modify Discontinue
Transfuse RBC: 1 Units	Routine, Transfuse 1 Units	Modify Discontinue
Transfuse RBC: 1 Units	Routine, Transfuse 1 Units	Modify Discontinue
Transfuse RBC: 2 Units	Urgent, Transfuse 2 Units	Modify Discontinue

Blood Request



✓ Accept

Type and Screen

Latest Results

No Type and Screen results in the last 72 hours.

Blood Type

No blood type on file.

Last Resulted Components

Date/Time	Component	Value	Lab Status
10/10/19 10:39	WBC	10.7	Final result
10/10/19 10:39	PLT	464	Final result

Transfusion History (Past 60 Days)

Prepare Orders

None

Consents

No documents found

Pediatric Blood Administration - Crossmatch Process (RBC)

☒ Paediatric Prepare RBC ML

✓ Accept

✗ Cancel

Urgent

Priority: Urgent

Specimen Type: Blood

Specimen Src: Blood, Veno

Prepare: mL

Transfusion Indications

Hgb < 7 g/dL Hgb 7-9 g/dL Hgb > 9 g/dL Clinically significant acute blood loss

Chronic Cardiac disease Acute Myocardial Ischemia Other (Specify)

Chronic Transfusion Program Exchange Transfusion

Type of Units

Whole Blood Packed Cells Irradiated packed cells Washed Packed Cells

Reconstituted Whole Blood Reconstituted Packed Cells

Special Requirements?

Yes No

Donor Source

Allogeneic Donor directed Autologous

Comments (F6): [Click to add text](#)

✓ Accept

✗ Cancel

☒ Ped Transfuse Red Blood Cells(In ML)

!

P Urgent

! Next Required

✓ Accept

Critical steps in the lab



2. SAMPLE TAKING



3. SAMPLE RECEIPT



4. TESTING



5. COMPONENT SELECTION



6. COMPONENT LABELLING

6b. STORAGE & TRANSPORTING

Sample Taking & labelling



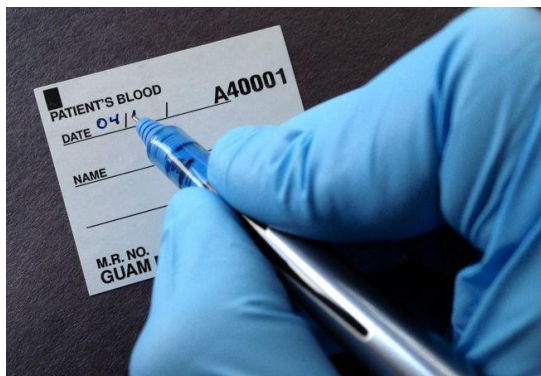
- A wrong blood in the tube (WBIT) sample has the potential to be fatal
- Positive patient identification before and after the sample taking. Check details with the patient's identification wristband
- Only take the sample from one patient at a time . Label the sample immediately after taking the blood
- Do NOT use pre-labelled tubes/ no transcribing

Use of Clinical collect device



Printer

Hand held scanner



Sample Receipt



- Information on the tube must match with that on the transfusion requisition in the LIS
- The recipient blood specimen must be less than 3 days old at the time of compatibility testing. If the interval between transfusions is more than 3 days, a new patient blood sample must be obtained for compatibility testing.
- The person who starts a compatibility test must also complete it
- Complete all compatibility testing before releasing blood for transfusion

Testing



- Blood selected for compatibility testing and transfusion should be identical or compatible with the ABO group & Rh (D) type as that of the recipient.
- All crossmatch tubes should show a negative reaction if the blood is compatible
- If a positive reaction is observed at any phase, the blood is incompatible and is not be released

Component Selection



Patients Group	First Choice of Donor Group	First Alternative Choice of Donor Group	Second Alternative Choice of Donor Group
"O"	"O"	None	None
"A"	"A"	"O" Packed RBC	None
"B"	"B"	"O" Packed RBC	None
"AB"	"AB"	"A" or "B" Packed RBC	"O" Packed RBC

Component labelling



- ISBT 128 is a uniform labeling standard for blood components designed to capture information regarding identification and content of blood and blood products and to make that information universally accessible to the international blood banking community.
- The technology was developed through international consensus and allows for world wide standardization of information for labeling and data exchange .
- Code 128 was chosen because it codes more data into a smaller space, easily handles alpha-numeric data, provides for internal scanning error checks.

(ISBT 128 Standard Technical Specification v5.10.0 2019)

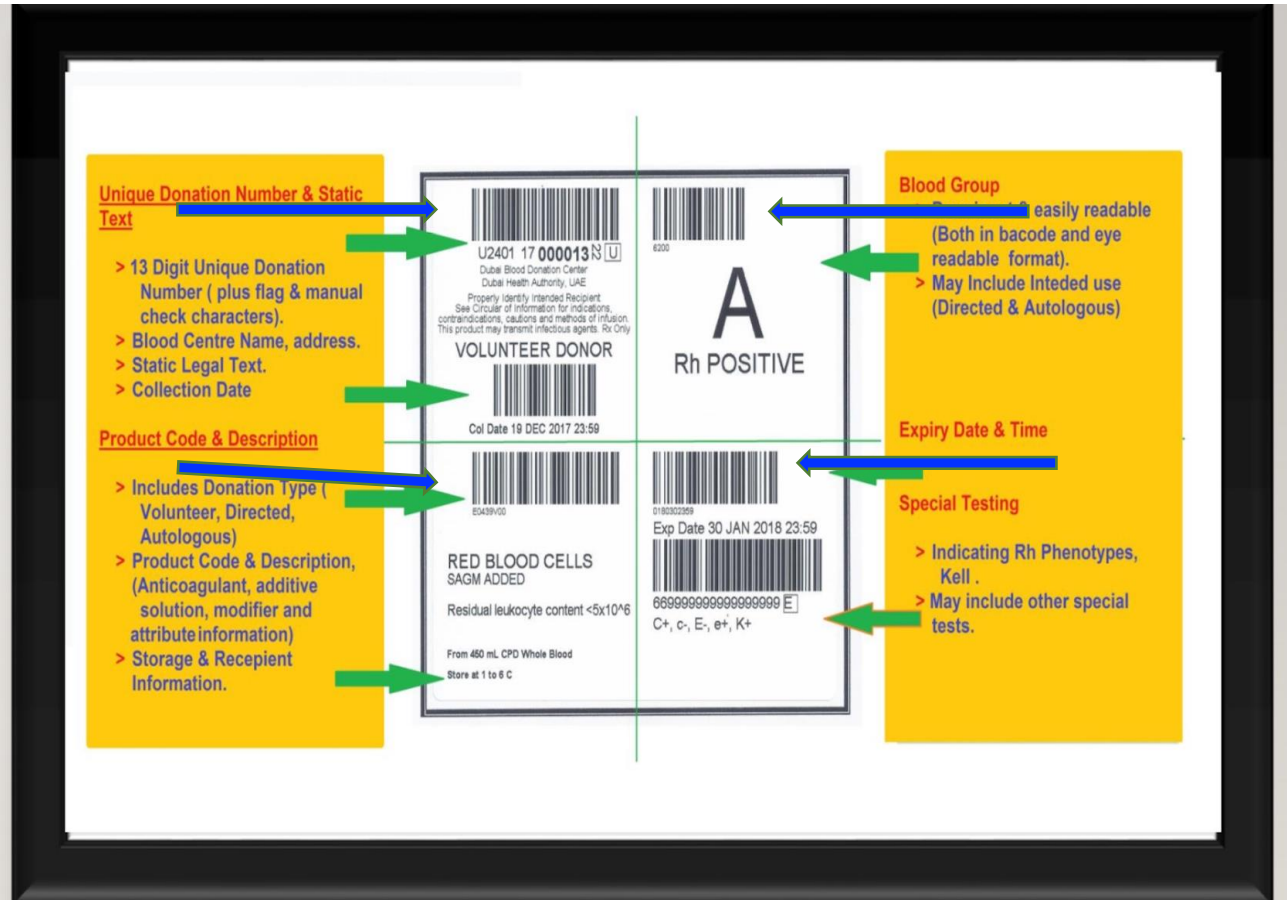
ISBT 128 label



ISBT 128 LABEL FORMAT

ISBT LABEL IS DIVIDED INTO FOUR QUADRANTS

- ☐ UPPER LEFT DONATION NUMBER
- ☐ LOWER LEFT PRODUCT CODES
- ☐ UPPER RIGHT BLOOD GROUP
- ☐ LOWER RIGHT EXPIRY DATE & TIME & SPECIAL TESTING



Allocate vs available blood



- Cross matched Blood component is assigned to the recipient in the LIS system and segregated and kept separately from the rest of the available blood.
- All Allocated & assigned blood are kept in a separate refrigerators
- Color coded by group and on different shelves in the fridge

Component collection



Cross matched & same blood group but not allocated blood

Unit Issue Information

Unit # U240119041310


Component PCA

Division 00

Select All Deselect All Mod Unit Loc

Select	Flags	Unit #	Status	ABO/Rh	Comp	Dv	Acc No	Armband	Vis Insp	Exp D/T
<input type="checkbox"/>		<u>U240119039133</u>	AL	O-POS	PCA (H)	00	W300246			31/10/2019,2359

Blood Product Issue

 Invalid unit ID.

OK

Component collection



Wrong blood group & not allocated selected

ABO/Rh B-POS RC Units Transf Last Transf Order Loc D05E Dx (Q) Other specified disorders of kidney and ureter-Other specified disorders of kidney and ureter-Other specified disorders of kidney and ureter

1. Antigens/Antibodies 2. Problems 3. Comments 4. Transfusion Attributes

Antigens/Antibodies Problems Comments Transfusion Attributes

Patient Specimen (5) Allocation (6) Units (7) Information (8)

HID/Area	Unit Number	Component	Dv	ABO/Rh	Status	Name	Antigens/Antibodies	Attributes/Spec. Tests	Exp	Release	ID	Emirates ID
QA Warnings Found												
QA warnings found, continue? Accession # X700930 Patient ID 107719525 HID UAE												
<input type="checkbox"/>	U240119041641	PCA	00	Warning message				Have authority to override?				
				Selected unit's ABO does not match patient's permanent ABO				Yes				
				Unit : A Patient : B								
<input type="checkbox"/>	U240119041641	PCA	00	Selected unit's ABO does not match specimen's ABO				Yes				
				Test : ABR Unit : A Specimen: B								
<input type="checkbox"/>	U240119041641	PCA	00	Unit is currently allocated to another order				N/A (warning only)				

Assigned by Patient ID
☒ Inventory
Branch to Blood Component Prep... (≡) Blood

Compatibility Testing

Unit	XM	TS
U240119041785 PCA:00	CXM	OK
U240119041880 PCA:00	CXM	OK
U240119041754 PCA:00	CYM	OK

OK Cancel Help

Component collection



- At the time of issuance, the blood component is checked by two blood bank staff (product type, correct patient name/ MRN, unit group, number and the expiry date) , visual inspection for unit integrity and color should be done before issuance ,document the issuance in issuance book and sign .
- The messenger or the nurse are instructed to handle the unit safely, not to remove from the cooler box until reaching the ward and not to return it back after 30 minutes

Blood Transportation

AABB standard 5.1.8

- Shipping containers should consist of **insulated** boxes and appropriate **coolant packs** and procedures shall be validated prior to use and periodically, to maintain the proper transport temperature.
- Transport containers should be appropriately **labelled and secured** to protect components from damage during transit.
- **Documentation** should accompany components in transit to permit their identification



Acceptable temperature

AABB standard 5.1.8A



Item No.	Component	Storage (°C)	Transport (°C)
1	RBCs Leukocytes Reduced	(1 – 6 °C)	(1 – 10 °C)
2	Leukoreduced pool Platelets	(20 – 24 °C) with continuous gentle agitation	(20 – 24 °C) (as close as possible to)
3	Apheresis Platelets Leukocytes Reduced	(20 – 24 °C) with continuous gentle agitation	(20 – 24°C) (as close as possible to)
4	Cryoprecipitate AHF	(≤ -18°C)	Maintain frozen state
5	Fresh Frozen Plasma (FFP)	(≤ -18 or ≤ -65°C)	Maintain frozen state

Administration



Pre
Transfusion
Checks, Assess
&
documentation

At bedside
Verify patient
& blood
product

Second nurse
independent
verification
Dual sign off

Prescription



Order Sets		?	Actions
▼ Pediatric Blood Administration Manage My Version ▼			
General		Collapse	
> Vital Signs for Transfusion		Click for more	
<input checked="" type="checkbox"/> Vital Signs for Transfusion As needed starting Today at 07:37 Until Specified			
▼ Notify Physician - Hold Transfusion			
<input checked="" type="checkbox"/> Hold Transfusion and Notify Physician if: Once First occurrence Today at 07:38			
▼ Nursing Interventions For Blood Admin			
<input checked="" type="checkbox"/> Nursing Communication: Maintain Patient Temperature > 36.0 degree Once First occurrence Today at 07:38			
<input checked="" type="checkbox"/> Nursing communication: Transfusion Reaction Management Routine, Until discontinued starting Today at 07:38 Until Specified For Suspected Transfusion Reaction: 1) Stop transfusion. Keep IV line open with normal saline. 2) As per policy to follow instructions.			
Transfusion Labs		Collapse	
> Blood Bank Tests		Click for more	
> Pre-Transfusion Labs		Click for more	
> Post-Transfusion Labs		Click for more	
Medications		Collapse	
> Medications During Transfusion		Click for more	
> Medications After Transfusion		Click for more	
Transfusion Orders		Collapse	
The following are how long blood takes to prepare per the DHA Guidelines:			
Urgent: < 1 Hour - The clinician needs the blood to be transfused urgently within 1 hour (example: Active Polytrauma Bleeding Patient)			
ASAP: < 4 Hours - The clinician needs the blood to be transfused within 4 hours (example: Stable Patient with Severe Anaemia)			
Routine: > 4 Hours - The needs for the blood to be transfused may be after 4 hours and up to 72 hours (example: Preparation of packed red for Future Surgery)			
> Blood Products Urgent		Click for more	
> Blood Products - ASAP		Click for more	
> Blood Products Routine		Click for more	
Additional SmartSet Orders (Type to search)		Collapse	

Processes & Policy

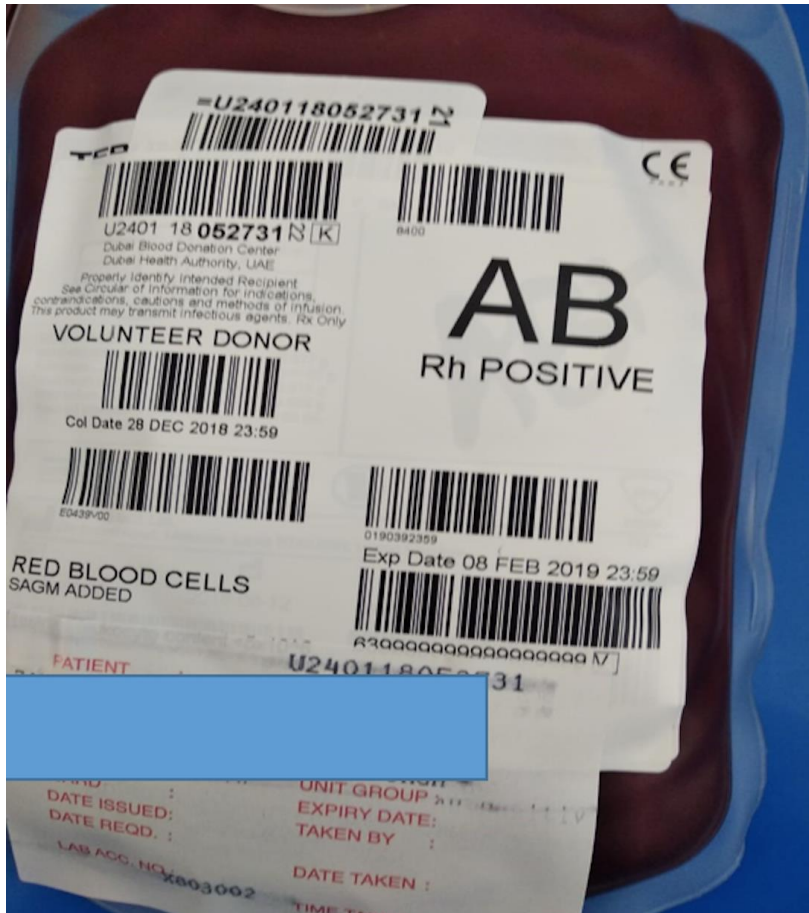


- Blood & blood product for only one patient to be collected at a time from the lab
- No interruptions during blood transfusion procedure. If interrupted then to start the verification again
- Patient verification and blood product scanning & preparation to be done only at the bedside with two nurses.
- Mandatory yearly training/ education for nurses

Scan patient arm band



Scan the blood product

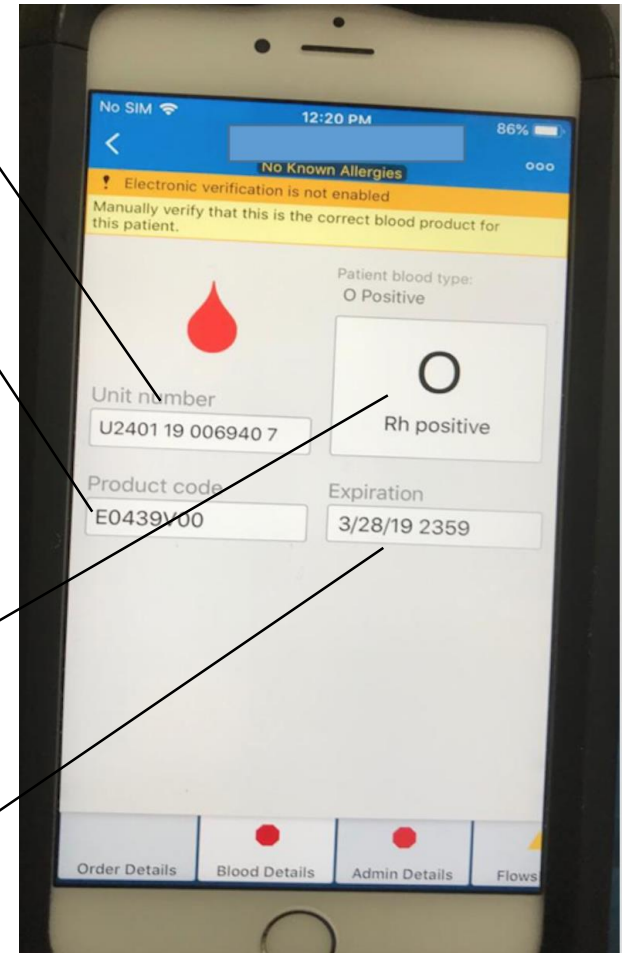


Unit number

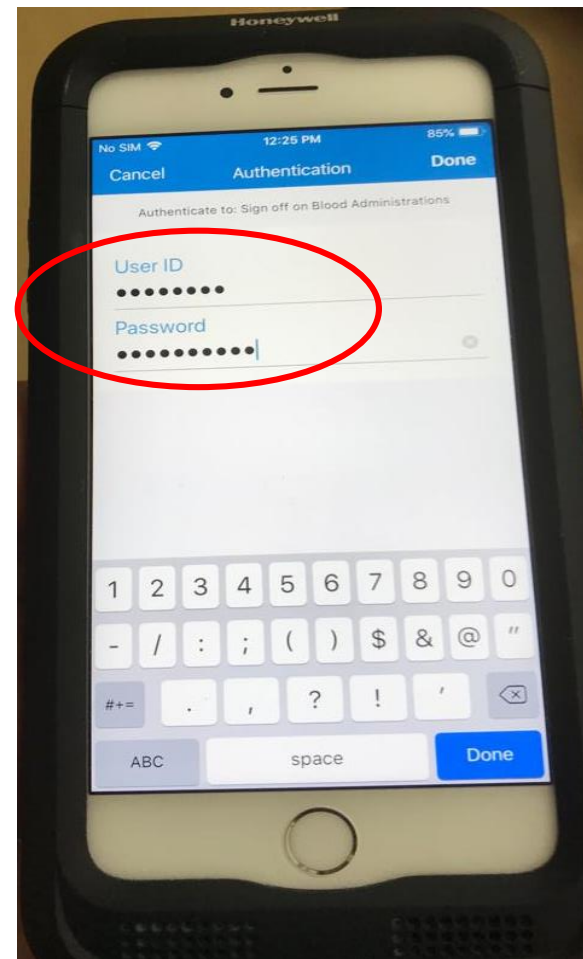
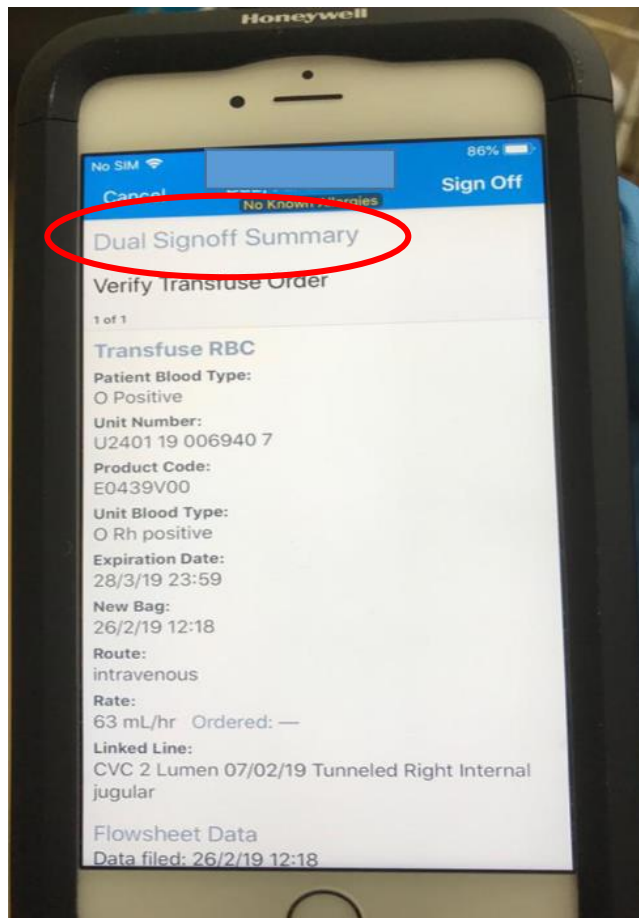
Product code

ABO & Rh group

Expiry date



Dual verification



Monitoring



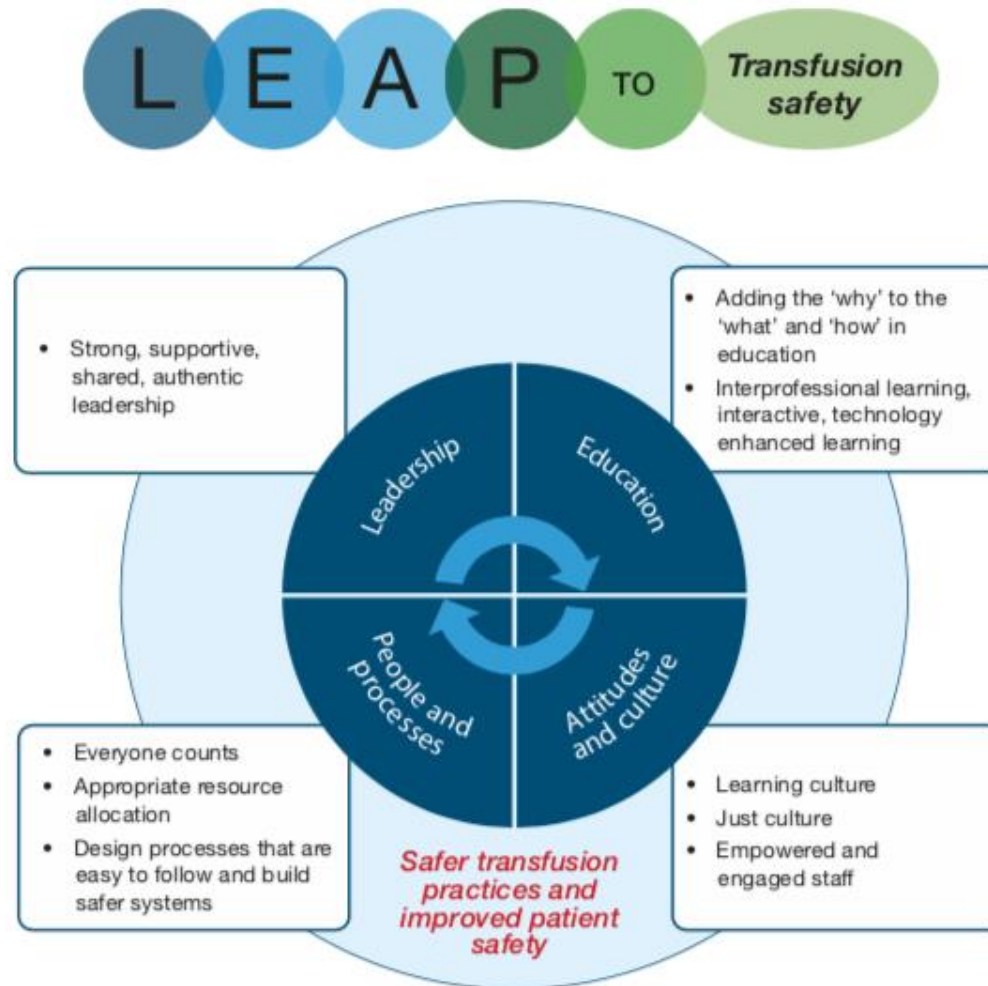
- Measure vital signs
 - **every 5 minutes X 3** times after the start of transfusion,
 - then every **30 minutes X 2** times,
 - there **after every hour** till the completion of the transfusion,
 - then **1 hour** following the completion of transfusion
- Monitor the IV Cannula patency throughout the transfusion
- Monitor patient for signs of reaction throughout transfusion
- A patient has an increased risk for reaction in the first 10 to 30 minutes of transfusion. Nurse must remain with patient for first 15 minutes after the start of infusion.

Summary



- Nurses, trained technical staff, and phlebotomists are involved in collecting, screening, modifying blood, and monitoring throughout the donation/transfusion process in a safe and standardized manner.
- One of the important aspects of improving safety include proper training of staff, along with a dedicated and diligent blood transfusion committee overseeing blood transfusion
- Nurses and laboratory technologists play a pivotal role in verifying patient information and ensuring that the **right blood product gets to the right patient at the right time.**

Conclusion



References



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<https://www.transfusionguidelines.org/transfusion-handbook/4-safe-transfusion-right-blood-right-patient-right-time-and-right-place>
2. Andrzejewski Jr C, Cloutier D, Unold D, Friedberg R 2014. Improving patient safety in transfusion medicine: contemporary challenges and the roles for bedside and laboratory biovigilance in addressing them. <https://www.dovepress.com/improving-patient-safety-in-transfusion-medicine-contemporary-challeng-peer-reviewed-fulltext-article-IJCTM>
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THANK YOU