HOSPITAL TENGKU AMPUAN RAHIMAH KLANG

MASSIVE TRANSFUSION PROTOCOL

1st March 2023

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MASSIVE TRANSFUSION PROTOCOL COMMITTEE

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Deputy Chairperson

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Coordinator

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Secretariat

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Dr Sudarcini a/p Arumugam	-	Transfusion Medicine Medical Officer
SO Nurul Aqilah binti Roslan	-	Transfusion Medicine Science Officer
MLT Mohd Anuar bin Mohd Akil	-	Transfusion Medicine Medical Lab Technologist

Members

Miss Sonya Kaur Sidhu	-	General Surgery Surgeon
Dr Uma Mariappan	-	Obstetrics and Gynaecology Specialist
Dr Ahmad Zakiyy Mohamed	-	Haematologist
Dr Rafidah Binti Abdul Rahim	-	Emergency Physician
Dr Wong Zi Sien	-	Anaesthesiology and Critical Care Specialist
Mr Ahmad Ikhwan Bin Mohd Sharfuddin	-	Orthopaedic Surgeon
Dr Shashini Bt Khairul AnuarAsokumaran	-	General Surgery Medical Officer
Dr JananeeVisualingam	-	Obstetrics and Gynaecology Medical Officer
Dr Lutfi Bin Ahamad Fouzi	-	Medical Department Medical Officer
Dr Vigneswary a/p Gopal	-	Emergency Medical Officer
Dr Rosfarahin binti Roslan	-	Anaesthesiology and Critical Care Medical Officer
Dr Trysha Lim Shi Wei	-	Orthopaedic Medical Officer

MTP COMMITTEE TERM OF REFERENCE:

i. Promote awareness on MTP practices in the hospital based on current protocol and guidelines.
ii. Proactively and regularly review MTP practice among various disciplines in the hospital.
iii. Conduct education and training among all clinical, laboratory and supporting staff involved in the MTP process.
iv. Monitor the MTP process (to collect, compile, investigate and analyse data of all adverse event and deviations relating to activation, collection, transfusion of blood and deactivation process).
v. Discuss the MTP process analysis and to review and improve the protocol and guidelines based on the analysis findings.

OVERVIEW OF MASSIVE TRANSFUSION PROTOCOL

INTRODUCTION

Haemorrhage is the most common cause of death within the first hour of arrival to a trauma centre. More than 80 percent of deaths in the operating room (OR) and nearly 50 percent of deaths in the first 24 hours after injury are due to exsanguination and coagulopathy.

Massive transfusions are unplanned event which require processing and delivery of large amount of blood products rapidly for a sustained period of time, significant preplanning and coordination between the blood bank, the emergency department, the OR, and delivery personnel is required. This large volume blood transfusion is properly designed as Massive Transfusion Protocol (MTP) according to local institution setting aiming to improve patients' outcome and sustain organ perfusion and oxygenation thus reducing morbidity and mortality.

The first MTP in HTAR was developed in 2013, subsequently data was collected from year 2018-2022 for audit and improvement. It summed up total of 198 cases of MTP activation and three classifiable haemorrhage causes namely trauma, surgical and obstetrics. It showed high number of patients survival contribute to the success of its management. However, some issues had arise including poor activation and deactivation management, form and blood sample issues, blood products wastage etc.

Thus, HTAR MTP committees are now proposing an improved activation protocol criteria, safe and rapid blood products delivery and coordination in clinical area based on the latest evidence and practise, previous feedback and audit to ensure efficient activation, rapid and safe blood products delivery and better coordination.

DEFINITION

Massive haemorrhage is defined as loss of one total blood volume within a 24hours period or 50% total blood volume loss within 3hours or bleeding in excess of 150ml/minute. Total blood volume of a pregnant lady is 100ml/kg, average size female 65ml/kg and average size male 70ml/kg.

Massive transfusion is when transfusion of ≥10 RBC units, which approximates the TBV of an average adult patient within 24 hours or transfusion of > 4 RBC units in 1 hour with anticipation of continued need for blood product support or replacement of 50% of the TBV by blood products in 3 hours.

MASSIVE TRANSFUSION PROTOCOL (MTP)

Massive Transfusion Protocol is designed to interrupt the lethal triad of acidosis, hypothermia and coagulopathy. Main cause of mortality in patients with massive transfusion are related to this lethal triad.

This protocol serve to standardize workflow between different services such as clinical care, laboratory testing and blood products and nursing care with the aim for clear communications and products delivery to the patient while minimize wastage.

GOALS OF MTP

i. Early recognition of blood loss
ii. Maintenance of tissue perfusion & oxygenation by restoration of blood volume and hemoglobin level
iii. Arrest of bleeding including with early surgical or radiological intervention
iv. Judicious use of blood component therapy to correct coagulopathy

ADVANTAGES OF MTP

i. Assure good patient care by having a standard protocol on specific actions to take for each service involved.
ii. Avoid delay in clinical care, laboratory testing and blood product transfusion and nursing care.
iii. Improved patient's survival and reduced rates of organ failure and post-trauma complications.

WORKFLOW OF MASSIVE TRANSFUSION PROTOCOL

MTP ACTIVATION

A. Clinical conditions where massive haemorrhage can occur:
   i. Severe intra-abdominal injury (intra-peritoneal bleed or retroperitoneal bleed)
   ii. Complex long bone fractures
   iii. Complex pelvic fractures
   iv. Complex facial fractures
   v. Penetrating chest and high force blunt torso injuries.

B. MTP Activation criteria

   i. Estimated blood loss > 30% of blood volume (>1.5L) within 3 hour or > 150ml/min
   ii. Persistence of class III shock despite of 2L of fluid resuscitation (1L crystalloid & 1Lblood)
   iii. Suggest for Trauma – Associated Severe Haemorhage (TASH) Score as a guideline

Trauma-associated severe hemorrhage (TASH score)

Parameters	Range	Score
Hemoglobin	<7	8
	<9	6
	<10	4
	<11	3
	<12	2
Base Excess	<-10	4
	<-6	3
	<-2	1
Systolic Blood Pressure	<100	4
	<120	1
Heart Rate	>120	2
Positive FAST		3
Clinically Unstable Pelvic Fracture		6
Open or dislocated femur fracture		3

* Score ≥18 indicates >50% probability Massive Transfusion, maximum score ≥27 associated with 100% Massive Transfusion (Yucel et al, 2006)

C. MTP Activation by clinician

i. MTP can only be activated by a clinician (surgeon / emergency physician / anaesthetist) in response to massive bleeding.

ii. A clinician shall be able to predict massive transfusion in a bleeding patient and subsequently identify MTP Coordinator from the respective department ideally a medical officer to communicate with Transfusion Medicine medical officer

MTP PACKAGE

A. First Cycle

i. Trauma Package

Within 30-45 minutes upon MTP Kit arrival at blood bank, issuance of First MTP Trauma package include:

- ✓ 4 units Packed Red Cell (emergency crossmatched)
- ✓ 4 units Fresh Frozen Plasma

*Additional component upon request with indications. Example for platelet request such as patient with underlying platelet disorder, patient on anti-platelet medication, patient with abnormal platelet count prior to operation.

ii. Obstetric Package

Within 30-45 minutes upon MTP Kit arrival at blood bank, issuance of First MTP Trauma package include:

- ✓ 4 units Packed Cell (PC) - emergency crossmatched
- ✓ 4 units Fresh Frozen Plasma
- ✓ 6 units Cryoprecipitate

*Additional component upon request with indications. Example for platelet request such as patient with underlying platelet disorder, patient on anti-platelet medication, patient with abnormal platelet count prior to operation.

B. Second and subsequent cycle

For both packages, second and subsequent cycles include:

i. 4 units PC
ii. 4 units FFP
iii. 4 units random platelet
iv. 6 units cryoprecipitate

Within 45 minutes of previous MTP package 4 units PC can be collected. While 4 units FFP, 4 units random platelet and 6 units cryoprecipitate will be issued within 45 minutes after update of continuation of MTP.

MTP COORDINATOR

Role of a MTP Coordinator:

i. Have good communication with Blood Bank, runner and related department

ii. To contact oncall MO Transfusion Medicine

iii. To inform MTP activation with:

   a. Name, IC number of patient
   b. Diagnosis and EBL
   c. Name of Specialist who activates the MTP
   d. MTP blood coordinator (name, phone number or speed dial)
   e. How many Safe O / PC has been given
   f. Location of activation

iv. Appoint runner, ideally House Officer: 1-2 person

v. Update patient's condition to oncall MO Blood bank within 60 minutes after first MTP Package issuance.

vi. To inform MTP deactivation, if no update receive within 60 minutes of first MTP Package issuance, MTP Auto-termination applied.

MTP RUNNER

MTP runner is ideally a house officer of the involved department at the scene of MTP activation.

The role of a MTP runner:

i. To fill up MTP Kit accordingly:

   a. Fill up 4 GXM form with complete patient's details
   b. Withdraw 5ml of patient's blood in each 3 EDTA bottles
   c. A copy of collection slip

ii. Bring MTP Kit to Blood Bank counter within 30 minutes after MTP activation and wait until issuance of blood

iii. To bring to Blood Bank:

   a. MTP Kit – containing completely filled up 4GXM forms, 3 EDTA tubes
   b. 2 blood box – with ice for RBC/FFP/Cryoprecipitate
      – without ice for platelet

MTP DEACTIVATION

MTP Deactivation must be decided by a clinician within 60 minutes after the MTP Package blood and blood products issued.

A. MTP deactivation criteria:
   i. Patient is haemodynamically stable - bleeding arrested
   ii. Patient with no active bleeding planned for imaging or surgical procedure
   iii. Patient is pronounced DNAR or Death

B. MTP Auto-termination

MTP Auto-termination appliedif Blood Bank does not receive any request to continue subsequent MTP within 60 minutes after the MTP Package blood and blood products issuance.

MTP KIT

A. MTP Kit

MTP Kit is designed to be used by MTP runner specifically to minimize time consumption for preparing GXM forms and specimen tube and collection form to be presented at blood bank counter.

B. MTP Kit consist of:
   1. 4 GXM forms (GXM sample form attached on the next page)
   2. 3 EDTA tubes
   3. 1 collection slip
   4. 3 Sticker label

C. MTP Kit preparation

Ideally MTP Kit shall be prepared by ward Sister by ensuring each of the 4 GXM Forms stamped with “Massive Transfusion Protocol” and “MTP Coordinator name and contact number”.

Sister and Team Leader in the respective ward shall monitor a number of MTP Kit stock available for use accordingly.

10 stamps are “Massive Transfusion Protocol” and “MTP Coordinator name and contact number” are supplied to these localities:

1. Red Zone, Emergency Department
2. General Operation Theatre
3. Maternal Operation Theatre
4. Labour Room
5. PAC
6. Ward 5B (Orthopaedic)
7. Ward 6F (Medical)
8. Ward 1A (Surgical)
9. Ward 5C (ICU)
10. Blood Bank

MTP GXM FORM

MASSIVE TRANSFUSION PROTOCOL

No. Makmal:

PER-SS-BT 105
(Pind. 1/2016)

BORANG PERMOHONAN TRANSFUSI DARAH
PERKHIDMATAN TRANSFUSI PERUBATAN

(Mesti dipenuhi dalam dua salinan. Tulis dengan pen mata bulat dan sila tandakan √ dalam petak yang berkenaan.)

Nama: (Tulis huruf besar)			No. Kad Pengenalan		No. Daftar
Hospital	Unit	Wad	Bangsa	Umur	Jantina
Pegawai Kenajaan Ya/Tidak	Kelas	Bayar/Percuma	Pakar Perunding		Kumpulan Darah Ada/Tiada
Diagnosa		Sebab transfusi komponen darah			Hb % atau keputusan lain yg berkaitan (Plt count etc)
Transfusi darah masa lalu? Ya/Tidak	Jika 'ya' sebutkan tarikh transfusi darah yang terakhir				Komplikasi?
Sekiranya pesakit seorang wanita, nyatakan —	Bil. kehamilan	Bil. Lahir Mati			Tanda-tanda 'Haemolytic Disease of Newborn'

Sampel darah diambil dan dilabel oleh:

Saya mengesahkan bahawa saya telah mengenalpasti identiti pesakit dengan bertanya secara langsung* dan memeriksa pelang pengenalan pesakit. Saya juga mengesahkan bahawa saya telah mengambil sendiri sampel darah pesakit tersebut dan melabelkannya dengan serta merta sebaik sahaja ianya diambil.

Tandatangan .....

Nama .....

Jawatan.....

Tarikh.....Waktu.....pg/ptg/petang

* (atau ahli keluarga / penjaga untuk kes-kes pediatrik dan pesakit yang tidak sedarkan diri)

Units/ mls

- ☐ WHOLE BLOOD .....
- ☐ PACKED CELLS .....
- ☐ PAEDIPACK .....
- ☐ PLATELET CONCENTRATE .....
- ☐ CRYOPRECIPITATE .....
- ☐ FRESH FROZEN PLASMA .....
- ☐ CRYOSUPERNATANT.....

SPECIAL REQUIREMENT :

- ☐ WASHED.....
- ☐ FILTERED.....
- ☐ IRRADIATED.....
- ☐ OTHERS : .....
- ☐ GROUP, SCREEN & HOLD

Nota:-

(1) Sila hantarkan 3ml-5ml sampel darah dalam tiub EDTA. Untuk makluman, ujian kesesasian memerlukan masa 2 jam.

(2) Dalam keadaan kecemasan, sila hubungi makmal transfusi darah untuk pembekalan segera berdasarkan keserasian pada peringkat awal ujian. Darah yang dibekalkan mempunyai risiko ketidakserasian yang kecil. Penggunaan darah tersebut merupakan tanggungjawab pegawai perubatan yang merawat.

(3) Darah yang tidak digunakan perlu dipulangkan dengan kadar segera ke makmal transfusi kecuali Pegawai Perubatan meminta dipanjangkan tempoh simpanannya di wad.

(4) **AMARAN: Setiap transfusi darah membawa risiko infeksi.**

WARNING: Every blood transfusion carries a small risk of infection.

Sekalan diperlukan

(a) Serta merta, tanpa ujian kesesasian darah (safe O) (untuk menyelamatkan nyawa) ☐

(b) Segera (lihat Nota 2) ☐

(c) Pada .....jam.....pg/ptg (Lihat Nota 3) ☐

(d) Sampel disimpan selama 24 jam. ☐

Saya mengesahkan bahawa sampel darah yang disertakan ini telah diambil daripada pesakit bernama seperti di atas dan dilabelkan mengikut prosedur kerja yang telah ditetapkan. Saya juga mengesahkan bahawa setelah diperiksa, pesakit ini memerlukan/ akan memerlukan transfusi darah.

Tandatangan: .....
Cop dan Nama
Pegawai Perubatan: .....
(Huruf besar)

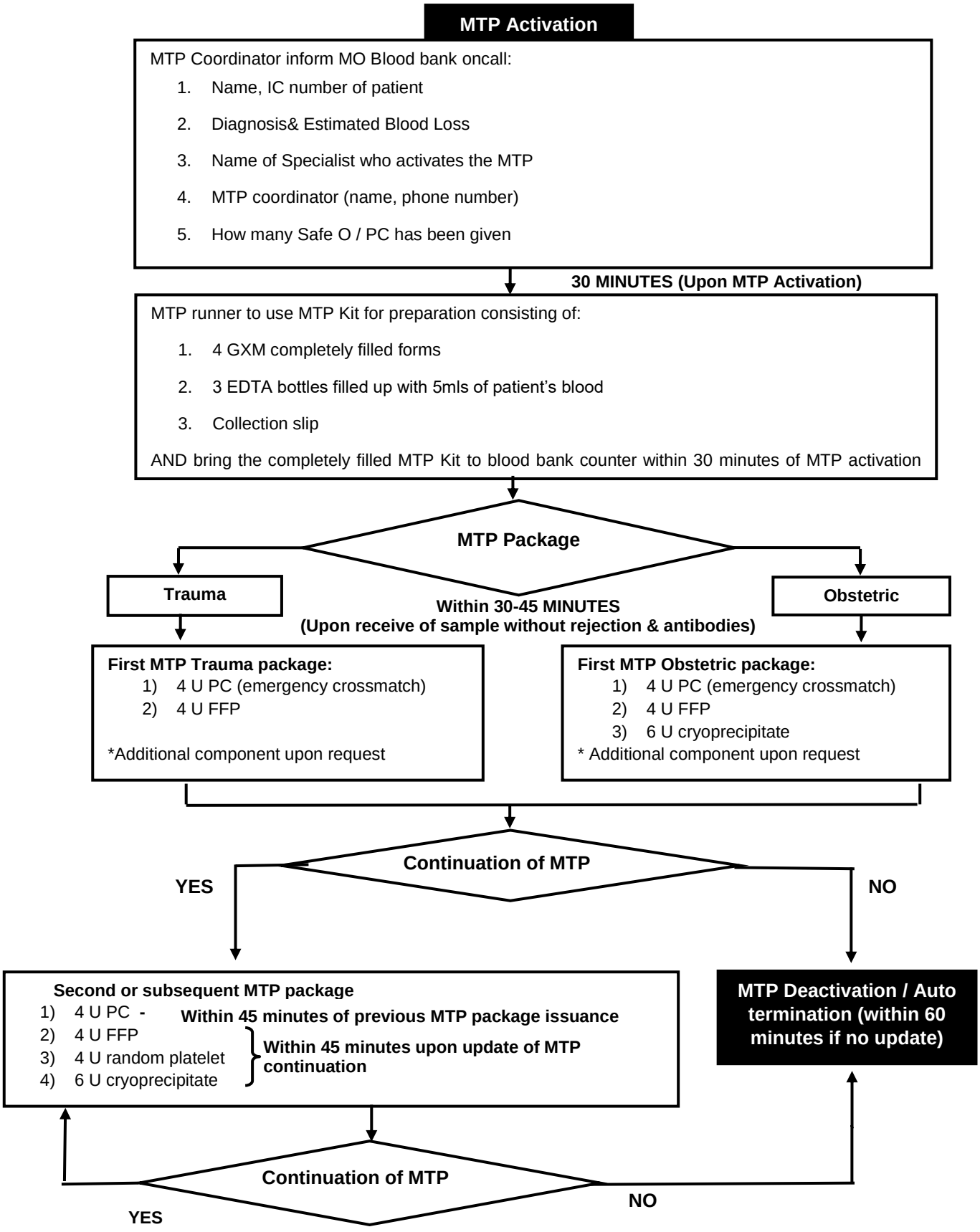
KHAS UNTUK KEGUNAAN KAKITANGAN MAKMAL TRANSFUSI DARAH

Permintaan diterima	T/Tangan	Anti A	Anti B	Anti AB	Sel A	Sel B	Sel O	Rh D	Kump. Darah	T/Tangan	Tarikh & masa
Tarikh..... Waktu.....pg/ptg											

Serum pesakit diserasikan dengan beg darah no.	UJIAN KESERASIAN DARAH					Catatan
	R.T.	37°C	AHG	T/Tangan.	Tarikh & masa	

MTP COORDINATOR
Name:
Phone no:

MTP FLOWCHART



MASSIVE TRANSFUSION PROTOCOL
Hospital Tengku Ampuan Rahimah Klang

1 MTP Activation

MTP Coordinator inform MO Blood bank oncall

- Patient's - name, IC number
- MTP blood coordinator –name, contact number
- Diagnosis & estimated blood loss
- Safe O / PC transfused prior MTP
- Specialist activating MTP
- Location

*Inform if require ADDITIONAL BLOOD COMPONENT with indications

2 MTP Runner

- MTP Kit (to fill up completely):
  - 4 GXM forms
  - 3 EDTA bottles
  - 1 Collection slip

MTP Kit samples to arrive within 30 minutes of activation

- Bring MTP Kit to blood bank counter with:
  - 1 ice box with ice (PC/FFP/Cryo)
  - AND / OR
  - 1 ice box without ice (Platelet)
- Wait until MTP Package blood supply

3 1st MTP Packages

Issuance within 30 - 45 minutes after sample arrival

Trauma

4 PC 4 FFP

Obstetric

4 PC 4 FFP 6 CRYO

*AND additional blood components upon request

4 Continuation of MTP?

60 minutes

Within previous blood package issuance

➡ MTP coordinator must update MO Blood Bank ➡

MTP Continuation

MTP Deactivation OR Auto-termination

5 Subsequent MTP Package

4 PC

Supply within 30 - 45 minutes of previous package issuance

4 FFP 6 CRYO 4 PLATELET

Supply within 45 minutes upon MTP Continuation update

Prepared by JPTD HTAR - 1st March 2023

MANAGEMENT OF BLOOD AND BLOOD COMPONENTS BAG

All used and unused blood product bag must be send to Blood Bank. This is especially because thawed FFP can be used up to 24 hours when kept at optimum temperature of 2°c -6°c and thawed cryoprecipitate can be used up to 4 hours when kept at optimum temperature 20°c -24°c.

PERFORMANCE INDICATOR

i. Duration of time from MTP activation to sample arrival to blood bank counter
ii. Duration of time from of product issuance from sample arrival
iii. Number of blood and blood products returned
iv. Timing of MTP deactivation
v. 24 hours patient's survival rate