REQUESTING AND ADMINISTRATION OF BLOOD PRODUCTS

Table of Contents

Table of Figures

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1. Policy:

A. Requesting Blood Products

1) Blood products can be requested whenever patient care can be improved by decreasing time to treament.

2. Purpose:

1) Improve patient care in the pre-hospital setting.
2) Provide timely access to life-saving treatment of blood products

3. Criteria:

1) The patient meets the mechanism of injury or nature of illness below and has at least two physiological parameters, the request may be made.
   a) For blood administration request, patients must be> 5 years of age with:
      (i) Signs of massive hemorrhage
      (ii) Traumatic injury (penetrating or blunt)
      (iii) Suspected dissecting/rupturing aneurysm (abdominal or thoracic)
      (iv) Gastrointestinal bleeding
      (v) Signs of intra-abdominal bleeding
   b) Physiological Parameters
      (i) Systolic blood pressure< 90 mm Hg
      (ii) Heart rate> 120 bpm
      (iii) Shock Index (SI)> 1 (Shock Index is calculated by the following: SI= Heart rate divided by systolic blood pressure)
      (iv) Pediatric patients> 5 years of age whose vital signs are consistent with blood loss as defined by their weight or age-based parameters in the Pediatric Multiple Trauma Protocol

4. Personnel Requirements for Activation

1) Any EMS employee or first responder personnel present at the scene of an injury or medical condition, and after an initial patient assessment may request this service.

2) The Medical Director, Operations Supervisor or any other administrative personnel may make the request prior to patient assessment if the mechanism of injury or patient's condition reflects the potential for blood administration

5. Personnel Requirements for Deactivation

1) EMS paramedic after patient evaluation

2) Operations Supervisor or administrative personnel at any time

3) The Medical Director or on-line medical control at any time

6. Procedure:

A. General:

1) After patient assessment and determining blood products will be needed, notify Medical Control

2) Continue your assessment and treatment of the patient until the responding Paramedic is on scene.

3) **Note:** At no time should an ambulance remain on the scene and not initiate emergent transport to the appropriate medical facility. If transport has been initiated prior to ALS arrival, they may intercept prior to hospital arrival.

B. Patient Preparation:

1) EMS personnel will follow departmental guidelines regarding care for trauma patients; however, the following will be included for patients where blood products are to be administered:

   a) The patient is fully exposed when applicable per protocol

   b) The patient's airway is intact and managed by ensuring the following:

      (i) Patient alert and following commands

      (ii) Advanced airway in place with confirmation of CO2 waveform

C. Criteria:

1) Hypoxia has been corrected
   a) Patient is on supplemental Oxygen
   b) Goal of oxygen saturation greater than 94%
2) External bleeding is controlled
   a) All major injuries with bleeding have been addressed
   b) Tourniquet placed for hemorrhage not controlled with pressure
3) IV/IO access is placed, functional and not infiltrated
   a) Patient has 2 functional IV /IO sites
      (i) ► Adult 18g IV minimum
      (ii) ► Pediatric 20g IV minimum
4) The patient is covered with a blanket
5) If EMS personnel can assist in having these items done prior to ALS arrival as appropriate, this will streamline the checklist process and help get blood products on board faster while transport is being facilitated
6) Note: The paramedic will be responsible for transfusion administration and related reactions should they occur.

7. Blood Administration

A. Clinical Indications:

1) Any patient where Blood Product Administration is indicated in the blood administration guideline, or where as ordered by a Physician.
2) Blood products are NOT to be administered to patients in Cardiac Arrest

B. Contraindications

1) Patient indicates refusal to receive blood
2) Medic alert tag indicating patient objection to receiving blood

C. Complications / Adverse Events

1) Non-hemolytic Febrile Transfusion Reaction (most common reaction)
2) Acute hemolytic reaction / ABO incompatibility

3) Bacterial contamination / Sepsis
4) Transfusion Related Acute Lung Injury (TRALI)
5) Volume Overload
6) Anaphylaxis
7) Allergic (non-anaphylactic) reaction
8) Delayed Hemolytic Reaction

8. Procedure:

1) Large bore IV access available. Separate IV sites are needed for FFP and PRBC products
2) Normal Saline IV fluid initiated
3) Remove Units from storage to be administered. **TWO providers** much cross check and confirm transfusion is required prior to administration
4) Verify Correct patient
5) Verify Blood Component is correct (Correct type, Correct component)
6) Verify Expiration Date
7) **Confirm Storage Unit Temperature monitor** in each unit is appropriate (not out of range/red)
8) Check for discoloration or gas bubbles present
9) Check and document patient temperature
10) If patient has apparent capacity and condition allows, discuss the procedure with the patient and secure consent.
11) Prime the tubing set and blood warmer if applicable
12) EMS provided blood and blood products must be warmed during administration
13) Interfacility blood administration does not have to be warmed
14) Initiate blood product administration and set appropriate rate
15) Monitor for transfusion reactions during the next 15 minutes
16) Second temperature must be taken at this time (i.e. 15 minutes into transfusion).

17) If a reaction occurs, **STOP** infusion and follow appropriate guideline. Retain all blood product and tubing for source testing

18) Document the procedure, time, and results

19) Blood product type, expiration date, and lot number **MUST** be documented for **EACH** blood product unit administered

20) Patient temperature must be documented prior to and 15 minutes after initiation of blood product administration

21) Blood bank paperwork must be completed with the yellow form given to the receiving staff at transfer of patient care

22) If administering O postive blood product to a female under 55 years of age, you MUST have a direct (OLMC) physician's order!

9. Educational Points / Caveats

1) Monitor patients for signs and symptoms of transfusion reaction and adverse effects, including temperature at time of infusion and 15 minutes after start.

2) For any reaction, STOP the infusion, remove all tubing and product from the patient and save all equipment. Flush IV line.

3) Consider any fluid overload issues such as CHF or patient weight (pediatrics) , and monitor for signs and symptoms appropriately.

4) Allergic reaction (onset <15 min) - Mild skin itching or hives < 25% body, Temp 38C (100.4F) or change of >1C (>1.8F) from pre-transfusion value, chills, and hives/rash >25% body

5) Febrile transfusion reactions: - Temp 38C (100.4F) or change of >1C (>1.8F) from pre-transfusion value, chills, headache, facial flushing, palpitations, cough, chest tightness, increased pulse rate and/or flank pain

6) Hemolytic transfusion reaction: - Immediate lysis of transfused blood can result in fever and/or tachycardia. Other symptoms can include chills, back/flank pain, nausea/vomiting, dyspnea, flushing, bleeding, and/or hypotension. Begin aggressive NS 0.9% treatment

7) Dilutional thrombocytopenia - This is generally not seen with infusion of 1 – 2 units, unless patient has pre-existing thrombocytopenia or disseminated intravascular coagulation.

8) Potassium intoxication (hyperkalemia) - Symptoms can include flaccidity, muscle twitching, bradycardia, EKG changes (tall peaked

T waves, prolonged P -R interval, absent P waves, prolonged QRS) and/or cardiac arrest.

9) Hypocalcemia: (from citrate toxicity that binds Ca) - Symptoms can include arrhythmias, hypotension, muscle cramping, nausea, vomiting, seizure activity, and/or tingling sensation in the fingers. Patient with acute or chronic hepatic insufficiency are at relatively higher risk of citrate toxicity. To avoid, administer PRBC at a minimum rate of 1 unit > 5 minutes. Treatment with Calcium Gluconate 1 gm infused slowly in a different IV/IO line.

10) Contact Medical Control for additional boluses as necessary

10. Certification Requirements:

1) Maintain knowledge of the indications, contraindications, technique, and possible complications of the procedure. Assessment of this knowledge may be accomplished via quality assurance mechanisms, classroom demonstrations, skills stations, or other mechanisms as deemed appropriate by the local EMS System.

11. Certification Level:

1) Paramedic and Higher Endorsements may perform this procedure

12. Quality Improvement

A. Key Documentation Elements

1) Initial and repeat Vital Signs – including Temperature
2) Indications for Blood Administration
3) Number, Size (gauge), and Location of Peripheral IV Sites
4) Names of providers verifying the correct Blood Component Identification.
5) Verification of Blood Product Expiration Date
6) Verification of Blood Product Unit Serial Number
7) Documentation of Storage Temperature confirmation
8) Documentation of repeat Vital Signs and Temperature at 15 minutes into Blood Infusion
9) Documentation of any signs/symptoms of transfusion reaction.

10) Blood product type, expiration date, and lot number **MUST** be documented for **EACH** blood product unit administered

11) Blood bank paperwork must be completed with the appropriate form given to the receiving staff at transfer of patient care.

    a) A copy of the blood bank paperwork must be attached to the ePCR.

12) **If administering O postive blood product to a female under 50 years of age, you MUST have a direct (OLMC) physician's order!**

13) Documentation of the Online Medical Control Physician authorizing administration of O Positive blood product to a female under age 50.

    a) **Obtain Physician Name and Signature**.

B. Process Improvement

1) Review and documentation of all Key Documentation Elements as noted above.

2) Review of any transfusion reactions or known/suspected complications or adverse events

3) Routine review of Storage Unit Temperature measurements and documentation.

4) Review of all completed blood bank documentation attached to ePCR.

Figure 1. Typical Blood Administration Record Format

Blood Transfusion Record

Patient Name (Print)	DOB
Patient ID	Date
Transferring Hospital Name	Transferring Hospital Blood Bank Phone Number
Receiving Hospital Name	Receiving Hospital Blood Bank Phone Number

Pre-transport Patient/Blood Component Identification

- ☐ Blood components are packed in a validated transport container with a label indicating the name of the receiving hospital blood bank
- ☐ Patient wristband ID compared with ALL blood component units at patient's bedside with hospital staff
- ☐ Number and type of components agrees with physician's orders
- ☐ Patient has a dedicated venous access line with only blood and/or 0.9% NaCl running
- ☐ Manifest/Packing slip and pre-transfusion blood specimen (if available) included

Hospital Staff (Print Name)	Hospital Staff Signature
EMT-CC or Paramedic (Print Name)	EMT-CC or Paramedic Signature
Ambulance Service (Print Name)	Agency Code Number

Patient/Blood Component Identification of Units Initiated During Transport (If Applicable)

- ☐ Number and type of components agrees with physician's orders
- ☐ Patient has a dedicated venous access line with only blood and/or 0.9% NaCl running
- ☐ Patient wristband ID compared with ALL blood component units at patient's bedside

EMT-CC or Paramedic (Print Name)	EMT-CC or Paramedic Signature

Vital signs, including patient temperature, are to be monitored every 10 minutes and recorded on Pre-Hospital Care Report (PCR).

Component	Unit ID Number	Unit ABO/Rh	Start		End		Adverse Reaction	
			Date	Time	Date	Time	Yes* (Record details on PCR)	No
							☐	☐
							☐	☐
							☐	☐

**If acute transfusion reaction is suspected: STOP THE TRANSFUSION, replace all tubing and maintain IV line with 0.9% NaCl. Immediately contact physician for evaluation and treatment orders. Do not initiate another unit unless advised to do so by a physician. EMT-CC or Paramedic must contact their Medical Control through their regionally approved system. Nurse from the transferring hospital who is responsible for the patient during interfacility transport must contact the transferring hospital's physician.*

Medical Control Contacted (Print Name of Medical Control Physician)	EMT-CC or Paramedic Signature
Transferring Facility Contacted (Print Name of Transferring Hospital's Physician)	Nurse from Transferring Facility Signature

- ☐ **Transfusion Reaction NOT Suspected (Check each item as completed.)**
- ☐ Empty blood bags discarded as medical waste
- ☐ Transport container given to receiving hospital
- ☐ Unused blood components given to receiving hospital
- ☐ Completed Blood Transfusion Record form given to receiving hospital
- ☐ Completed PCR given to receiving hospital
- ☐ Manifest/Packing slip and pre-transfusion specimen given to receiving hospital

- ☐ **Transfusion Reaction Suspected (Check each item as completed.)**
- ☐ All blood bags & used administration sets given to receiving hospital
- ☐ Transport container given to receiving hospital
- ☐ Unused blood components given to receiving hospital
- ☐ Completed Blood Transfusion Record form given to receiving hospital
- ☐ Completed PCR given to receiving hospital
- ☐ Manifest/Packing slip and pre-transfusion specimen given to receiving hospital

Receiving Hospital Staff (Print Name)	Receiving Hospital Staff Signature	
Title	Date	Time

Copies of Completed Blood Transfusion Record Form to Receiving Hospital Blood Bank, Ambulance Transfusion Service, Issuing Hospital Emergency Room and Blood Bank

Figure 2. Typical Transfusion Reactions and Management

REACTION	CLINICAL FEATURES	MANAGEMENT	NOTES
Non-hemolytic febrile transfusion reaction (alloimmunized recipient produces cytokines due to donor leukocytes/HLA antigen)	➢ Shivering, fever, ± headache, nausea, flushing, tachycardia ➢ Usually develops 30-60 mins after initiation	Continue slowly/stop Monitor frequently Tylenol	Most common reaction (≈ 1 in 8 patients) The patient is HOT – but otherwise WELL
Acute Hemolytic reaction / ABO incompatibility	➢ Fever ➢ Hypotension ➢ Agitation ➢ Flushing ➢ Abdominal/Chest Pain ➢ Bleeding/DIC ➢ Occurs within minutes of initiation	ABCDs STOP INFUSION Supportive Management	The patient is SICK Patient with fever + hypotension Differentiate (from sepsis) by agitation/flushing vs rigors
Transfusion Related Acute Lung Injury (TRALI)	➢ Acute Respiratory Distress Syndrome (ARDS) ➢ Dyspnea ➢ Cough ➢ Occurs < 6 hours after initiation (Usually ≈ 2 hrs)	ABCDs Oxygen ICU	Symptoms similar TRALI if no history of CHF/LVF. Overload more likely if history of CHF/LVF
Fluid Overload	➢ Dyspnea ➢ Hypoxia ➢ Tachycardia ➢ Increased JVP ➢ Crepitations/Rales	Treat as Acute CHF/LVF ↘Furosemide ↘Oxygen ↘CPAP/BiPAP	
Anaphylaxis (IgA mediated)	➢ Bronchospasm, ➢ Cyanosis ➢ Hypotension ➢ Soft Tissue Swelling	Treat as Anaphylaxis	
Allergic Reaction (Plasma Protein Incompatibility)	➢ Urticaria ➢ Itching	Antihistamines	Rarely severe
Bacterial Contamination	➢ Fever ➢ Hypotension ➢ Rigors (→ Septic Shock)	Treat as sepsis ↘Antibiotics	
Delayed Hemolytic Reaction	➢ Anemia ➢ Fever ➢ Jaundice ➢ Hemaglobinuria ➢ Occurs 1 – 4 weeks after infusion	Monitor renal function Specific treatment rarely required	