Berkeley Medical Center Jefferson Medical Center *POLICY AND PROCEDURE MANUAL*	**Policy EAST LAB-BB 002** **1st Effective 05/05/2016** **Revised1/17, 2/18, 1/19, 2/20, 2/21, 3/23, 3/24,** **Reviewed 2/17, 2/18, 10/18, 1/19, 2/20, 2/21, 3/23, 03/21/2025**

EAST LAB-BB 002 Blood Component Transfusion Criteria

Adults

A. Packed Cells: **Dosage one unit of red blood cells will raise the Hbg by 1 gram; Hct by 3% in a 70kg adult.** *Red Blood Cells should be transfused based on clinical need. In the absence of acute hemorrhage, RBC transfusion* ***should be given as single units****. Hemoglobin equilibrates 15 min after transfusion of a non-bleeding or hemolyzing patient.*

1. Symptomatic anemia in a normovolemic patient.
    a. Symptomatic anemia should be documented by symptoms of weakness, headache, dizziness, disorientation, breathlessness, palpitations or chest pain and signs of pallor and tachycardia
2. *Hemoglobin < 7g/dL or Hematocrit < 21% includes critically ill patients with stable cardiac disease; Hemoglobin <6g/dL in a young, healthy patient or patients with chronic symptomatic anemia; < 8g/dL acute coronary syndromes on hospital admission.*
3. Acute loss of at least 15% of estimated blood volume with evidence of inadequate oxygen delivery following volume resuscitation.
4. Preoperative hemoglobin < 8 g/ dL and operative procedures or clinical situations associated with major blood loss.
5. *Severe Thalassemia maintain Hgb at 9.5-10.5.*
6. Active bleeding and lab results not available.
7. Patient with Septic Shock and Hemoglobin less than 10g/dL.
8. Notes:
    a. *RBC should not be used to treat anemia that can be corrected with non-transfusion therapy (example, iron therapy)*
    b. *RBC should not be used as a source of blood volume, to increase oncotic pressure, or improve a sense of well-being.*
    c. *The use of only Hgb level as a transfusion trigger should be avoided*

B. Platelets: **Note: If quick reversal is required, platelet transfusion may be appropriate to reverse the pharmacological effects of PLAVIX.** Platelets are available as one (1) apheresis unit equivalent to 4-6 random units**. Platelets are not readily available at JMC; they must be ordered and delivered. BMC typically has a unit available.** One unit of Apheresis Platelets would be excepted to increase the platelet count of a 70kg adult by 30,000-60,000/μL

Measure platelet count response 10-60 minutes after transfusion.

1. Prophylaxis <$10x10^3$μ/dL platelet count
2. Significant bleeding <$50x10^3$μ/dL platelet count
3. Invasive procedure <$50x10^3$μ/dL platelet count
4. Massive blood loss and abnormal bleeding (platelet count pending)
5. *Note:*
    a. *Neurologic, ophthalmologic procedures and multiple traumas may require a platelet count near 100,000/μL*
    b. *Transfusion may be required with adequate counts when known or suspected plt dysfunction results in bleeding.*
    c. *Not indicated when plt dysfunction is extrinsic to the plt (uremia, hyperglobulinemia, certain types of von Willebrand disease).*
    d. *Not indicated for ITP patients; except for elective splenectomy with plt counts <10,000 μL.*
    e. *Not indicated for TTP, except for life threatening hemorrhage or before invasive procedures.*

C. **Fresh Frozen Plasma and FP24** (Plasma Frozen within 24 hours after Phlebotomy) **and PF24RT24** (Plasma Frozen within 24 hours after phlebotomy, held at room temperature up to 24 hours after phlebotomy). One unit contains

approximately 200-300 mL of plasma, and the usual dosage is 10 to 20 mL/Kg. Thawed Plasma used interchangeably.

Consider Kcentra or Prothrombin Complex (This product is not used at JMC but it is available thru the BMC Pharmacy) for Coumadin reversal in serious/life threatening bleeding.

1. Severe blood loss (approximately one blood volume). Coagulation testing not available.
2. PT or PTT >1.5 times the upper limit of normal or mean reference range in a non-bleeding patient scheduled for or undergoing surgery or invasive procedure.
3. PostOp bleeding/persistent oozing with documented coag abnormality (PT or PTT>1.5 normal).
4. Disseminated intravascular coagulation (DIC), abnormal bleeding.
5. Patients with multiple factor deficiencies, including severe liver disease to correct or prevent bleeding complications.
6. Coumadin effect-active bleeding. Includes emergency reversal of coumadin anticoagulant.
7. Inherited factory deficiency (X,VII,V). Used only when virus inactivated concentrates are not available.
8. Thrombotic Thrombocytopenic Purpura (TTP) therapeutic plasma exchange.
9. *Massive Transfusion (10 units of blood in a 24 hour period) with coagulopathic bleeding.*
10. ***Note**:*
    a. Do not use FFP when coagulopathy can be corrected more effectively with specific therapy, such as Vitamin K, Prothrombin Complex, Cryoprecipitate, or Factor VIII concentrates.
    b. Do not use FFP when blood volume can be safely and adequately replaced with other volume expanders.
    c. Do not use FP24 or Thawed Plasma for replacement of coagulation Factors V and VIII.
    d. *Do not use for normalizing abnormal coagulation results in the absence of bleeding.*

D. **Cryoprecipitate:** Hypofibrinogenemia is not likely to contribute to or cause hemorrhage until the fibrinogen falls below 50-80mg/dL: Results unreliable when less than 100 mg/dL. Dose is one *pool of 5 units raises the fibrinogen ~50mg/dL.*

(This product is not used at JMC but it is available at BMC)

1. von Willebrand's disease emergency source
2. Hemophilia A (if virus inactivated factor VIII concentrate is not available)
3. Hypofibrinogenemia (fibrinogen <80-100 mg/dL) particularly in DIC.
4. Used in isolated factor XIII deficiency when concentrates not available.
5. Fibrin sealant is preferable to cryoprecipitate with respect to safety and efficacy.
6. Massive transfusion when one or more blood volumes (4-5,000mL in an adult) have been replaced and Fibrinogen <100 mg/dL.

E. **Liquid Plasma:** prepared from Whole Blood and stored at 1-6C, expires 5 days from the end of the whole blood dating period. The profile and activity of plasma proteins involved in coagulation are not completely characterized. Levels and activation state of coagulation proteins in Liquid Plasma are not dependent upon and change with time in contact with cells, as well as the conditions and duration of storage. Contains viable lymphocytes that may cause graft-versus-host reactions in susceptible patients.

ONLY used for the initial treatment of adult patients undergoing massive transfusions.
Available at BMC not JMC.

F. Factor VIII Concentrate (This product is not used at JMC and is available through BMC Pharmacy)

1. Hemophilia A or severe von Willebrand's disease

G. Albumin: (available at JMC and BMC through pharmacy)

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H. Rhogam: available at both JMC and BMC for Rh negative, child-bearing individuals and Rh-negative individuals with the ability to be child bearing.

1. Spontaneous abortion
2. Antenatal 28 week gestation
3. Postpartum of Rh positive or unknown Rh type of infant
4. Recipient of Rh positive platelet concentrates.
5. Amniocentesis
6. Invasive obstetric procedures
7. Abdominal trauma during pregnancy

Newborn (under 4 months of age)

A. Packed cells: Dosage: a dose of 10-15 mL/Kg will raise Hbg by about 2-3 g/dL. Give CPD or CPDA-1 red cells if available and have an approximate Hct yield of 60%. AS additive AS- 3 and AS-1 are next choice. AS-preserved RBC unis should be used with caution in setting where large volumes are being transfused.

Group O negative CMV negative, Hgb S negative, irradiated product must be ordered at JMC. BMC stocks a Pedi pack in inventory.

1. Hematocrit (HCT) <20% with low retic count and symptomatic anemia (tachycardia, tachypnea, poor feeding)
2. HCT <30% and with any of the following:
    a. On >35% oxygen hood
    b. On oxygen by nasal cannula
    c. On continuous positive airway pressure and/or intermittent mandatory ventilation on mechanical ventilation
    d. With significant tachycardia or tachypnea (heart rate >180 beats/min for 24 hours or respiratory rate >80 for 24 hours.
    e. With significant apnea or bradycardia
    f. With low weight gain
3. HCT <35% with either of the following:
    a. On >35% oxygen hood.
    b. On continuous positive airway pressure/intermittent mandatory ventilation with mean airway pressure > 6-8 cm of water.
4. HCT <45% with either of the following:
    a. On extracorporeal membrane oxygenation(ECMO)
    b. With congenital cyanotic heart disease

B. Platelets guidelines in Neonates and Older children: Dosage: 5-10mL/Kg of platelets should result in a 50,000-100,000/mm increase.

1. With Thrombocytopenia: and a failure of platelet production
    a. Platelet count 5,000 – 10,000.
    b. Platelet count <30,000 in neonates.
    c. Platelet count < 50,000 in stable premature infants with active bleeding or before invasive procedure.
    d. Platelet count <100,000 in sick premature infant with active bleeding or before invasive procedure.
2. Without Thrombocytopenia:
    a. Active bleeding in association with qualitative platelet defect.
    b. Unexplained excessive bleeding in a patient undergoing cardio bypass
    c. Patient undergoing ECMO

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C. Fresh Frozen Plasma in Neonates and Older Children:

a. Support during DIC
b. Replacement therapy when specific factor concentrates are not available or during therapeutic plasma exchange.
c. Reversal of Warfarin in an emergency situation, such as before invasive procedure with active bleeding.

D. Cryoprecipitate in Neonates and Older Children: Dosage is 1-2 single units per 10 kg, pooled cryo is average to be 5 single units. Frequency depends on the half-life and recovery of the factor being replaced.

a. Hypofibrinogenemia or dysfibrinogenemia with active bleeding or while undergoing an invasive procedure.
b. Factor XIII deficiency with active bleeding or while undergoing an invasive procedure.
c. Hemophilia A when factor VIII is not available.
d. Von Willebrand's disease with active bleeding when DDAVP is contraindicated or not available
e. When factor concentrate is not available

Child Guidelines for RBC in patients older than 4 months

A. Packed Cells

1. Emergency surgical procedure in patients with significant postop anemia.
2. Preop anemia when other corrective therapy is not available.
3. Intraoperative blood loss >15% total blood volume.
4. HCT <24% and:
    a. Preop with signs and symptoms of anemia.
    b. On chemotherapy/ radiation therapy.
    c. Chronic congenital or acquired symptomatic anemia
5. Acute blood loss with hypovolemia and not responsive to other therapy
6. HCT <40% with respiratory failure or on a ventilator.
7. Sickle Cell Disease and the following:
    a. Cerebrovascular accident
    b. Acute chest syndrome
    c. Splenic sequestration
    d. Aplastic Crisis
    e. Recurrent Priapism
    f. Preop with general anesthesia (Target is 10 mg/dL)

Additional Considerations

Transfusion Reactions may occur, refer to Transfusion Reactions Symptoms and Management and Transfusion Reaction Investigation Procedures.

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Guidelines for Correction of Excess Oral Anticoagulants:

1. Patients on warfarin with serious bleeding can be treated with Vitamin K, FFP, or 4-Factor (PCC) as clinically warranted.
    a. 4-Factor Prothrombin Complex Concentrates (PCC) are preferable to FFP for situations requiring urgent reversal of warfarin.
2. Reversal for new anticoagulants:
    a. For patients with life-threatening bleeding, treatment may include discontinuation of the medication and the option to urgently administer either 4-Factor PCC or other reversal agents. However, this is off label use with limited studies.
    b. 4-Factor PCC and other reversal agents may be available in pharmacy.

Considerations for patients with Sickle Cell Disease (SCD): *Chronic transfusions can reduce the risk of recurrent stroke to less than 10% if hemoglobin (Hbg) levels are maintained between 8 and 9 g/dL with a Hbg S level less than 30%. In general, patients with SCD should not be transfused if Hbg > 10 g/dL. Units should be Hgb S negative and leukocyte reduced to prevent HLA alloimmunization and platelet refractoriness in preparation for possible stem cell transplantation. Since patients with SCD have the highest rates of alloimmunization of any patient group, it is best to perform a thorough phenotype analysis of a patient's red cells before beginning transfusion therapy. The most common protocol is to provide phenotypically compatible blood for C, E, and Kell antigens to prevent alloimmunization. Once patients have developed a red cell antibody, phenotyping should be extended for Fy, Jk and S antigens to prevent further alloimmunization. Due to the complicated nature of finding the best possible product for the sickle cell patient,* ***ADVANCED*** *notification of the intent to transfuse this patient population is extremely important.*

Considerations for anemic patients receiving or awaiting Chemo or Radiotherapy: *Nearly 50% of all cancer patients experience anemia associated with the disease or treatment regimen. Anemia (defined as Hgb <11 g/dL) has been shown to have effect on tumor hypoxemia and thus the tumor's response to chemo or radiotherapy, as well as quality of life for the patient. However, in general Hgb levels > 12g/dL are associated with increased morbidity and mortality. Recent clinical studies indicate transfusion triggers differ, thus the Hgb goals are cancer specific.*

For patients that do not get appropriate platelet increments: *consideration should be given for specially selected platelets, such as HLA-matched, crossmatch-compatible, HLA antigen negative and HPA antigen negative platelets. These testing procedures are performed by our reference laboratory. Communication and consultation between the physician and the Medical Director of the reference laboratory may be necessary to ensure appropriate testing is performed for each individual patient test case.*

References

Current Jefferson Medical Center and Berkley Medical Center Blood usage criteria
AABB Technical Manual current edition, 21st ed
AABB standards current, 34th ed.
Guide to Patient Blood Management and Blood Utilization AABB publication 2020
Circular of Information for the Use of Human Blood and Blood Components, revised Dec 2021
ARC Compendium of Transfusion Practice Guidelines (success.redcross.org) 2021
RBC Transfusion Data Card (Adult and Pediatric), AABB, 2017
Transfusion Patient Blood Management Oct 2017
Blood Transfusion Therapy a Physician's Handbook AABB 14th edition
Management of Anticoagultion for Venous Thromboembolism in the Hospitalized Adult. *Journal of Hospital Medicine* August 2019

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Retirement Date:

Distribution: BMC Blood Bank Manual
JMC Blood Bank Manual
Online Policy Manager

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Revision (Item):	Page:	Date:	Revised By:
Updated Format and combined with BMC for joint policy, references changed	All	10/24/16	PTB
Header format and director change	All	1/30/17	PTB
Removed dosage calculation for KCentra, Factors are now in BMC pharmacy	All	2/14/18	MBW
Updated References	7	1/16/19	MBW
Update ARC references and treatment for oral anticoagulants. Remove treatment for rtPA. Update Header and References. Update additives and dosage cryo for neonates.	All	2/10/20	MEB
Update therapy for anticoagulants. Remove TACO. Added in Addition Considerations. Update References.	3,4, 5	2/18/20	MEB
Updated number of random units in Apheresis platelets and added the expected increase Aphereis platelets	1	2/16/21	MEB
Updated Header and policy numbers. Updated range of increase of platelet. Added PF24RT24. Removed Whole Blood and transfusion criteria for Albumin. Added other additives for Newborn. Updated References	Header, 1,2,3,5	2/5/2023	MEB
Changed distribution from MCN to Online Policy Manager	6	3/14/23	JLS
Change female to individuals. Updated additives for neonates	2,3	3/2/2024	MEB
Added Liquid Plasma, Updated References	2,5	3/9/3025	MEB