UCSF Health

ADULT
NEONATAL
PEDIATRIC
NURSING PROCEDURE

BLOOD PRODUCT TRANSFUSION/ADMINISTRATION

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Blood and Blood Component Administration *(continued)*

Critical Points

1. Informed consent is required prior to administering blood products, with the exception of emergency situations and for those patients who lack of capacity for decision making and have no available surrogate to advocate otherwise.
2. Copies of signed consent forms must be present at the time of transfusion. Use of either paper form or scanned copy in EHR is acceptable.
3. The indication for the transfusion of blood product(s) is known by the RN prior to transfusion.
4. Monitoring for signs and symptoms of adverse reactions related to blood product transfusion is performed by RNs during and post-transfusion.

Supplies

- Y-type Blood Solution Set, 170-260 micron filter for gravity administration *(PMM 5926* or *PMM 20336)*
- SmartSite Blood Infusion Set, 180 micron filter for Alaris pump administration (*PMM 62429*)
- Blood Administration Set, 150 micron filter for Medfusion syringe pump administration *(PMM 133192* or *PMM 544271)*
- Medfusion pump Extension set tubing (*PMM 180998*)

Blood Bank Labs (Type & Screen and Blood Type Confirmation Tests)

Pertinent Information

The Blood Bank requires 2 separately drawn blood specimens to identify the patient's blood type and verify the blood type to reduce the risk of transfusion errors.

1. **Type & Screen test**
    a. This test identifies the patient's blood type (ABO and Rh) and also screens for common and unexpected antibodies prior to red cell transfusions.
    b. A current Type & Screen blood sample (current = sample drawn within previous 3 days) is required for preparation and release of red cell products by Blood Bank.
    c. Type & Screen results expire after 3 days (i.e., if date of draw = day 0, sample expires at midnight on day 3). Check EHR to confirm sample is current (review expiration date) as a new sample for Type & Screen testing may be required for preparation and release of red cell products from Blood Bank.
    d. Blood sample must have a label with patient's full legal name and MRN and must be **signed**, **dated**, and **timed** (sample draw date/time) by the phlebotomist/RN/MD (full legible name, initials or MD provider number).
        - While a signature and hand-written date and time are not required when specimens are collected and labeled using barcode lab labeling with Collection Manager, the printed label must display all information correctly.
2. **Blood Type Confirmation test**
    a. Blood Type Confirmation (ABO/Rh) testing is required to meet regulatory requirements to reduce the risk of transfusion errors resulting from sample labeling and patient identification errors. This test confirms Blood Type with results obtained from testing (Type & Screen) an earlier specimen sent on a

current or prior visit. This test is only required ONCE for all patients to verify blood type. This test result is valid for all UCSF inpatient and outpatient transfusion requests and does not "expire".

b. The sample for Blood Type Confirmation testing MUST always be drawn as a SEPARATE phlebotomy. To avoid patient identification and labeling errors and prevent ABO incompatible transfusions, it is critical to avoid drawing samples for Type & Screen and the Blood Type confirmation, at the same time or through a single phlebotomy. If both samples are required for a patient with no previous UCSF blood bank records it is important to follow process described, and collect the Blood Type sample separately, using a second phlebotomy and going through the patient identification process again.

c. Blood sample must have a label with patient's full name and MRN and must be SIGNED, DATED and TIMED (sample draw date/time) by the phlebotomist/RN/MD (full legible name, initials or MD provider number).

- While a signature and hand-written date and time are not required when specimens are collected and labeled using barcode lab labeling with Collection Manager, the printed label must display all information correctly.

d. After the provider orders the Blood Type Confirmation test, Blood Bank staff reviews need for the test, releases the order in EHR when indicated (this makes it "releasable" to nursing on the Kardex), and then notifies the RN via phone that the lab test is released. RNs should not release Blood Type Confirmations orders.

- OR & Preop: Due to workflow challenges, OR & Preop are exempt from this BB-driven 'release of order in EHR'. However, all other requirements for Blood Type confirmation test continue to apply.

Procedure: Obtaining Samples for Type & Screen and BLOOD TYPE Confirmation Tests

Blood Bank lab tests help prevent adverse events related to incorrect blood typing.

- Patients who have not had Blood Bank lab testing at UCSF (inpatient or outpatient) since 2006, and now need blood products prepared or transfused require two **separately** drawn (separate phlebotomy procedures, each with 2-patient identifier verifications) samples tested for Blood Type to confirm their blood type. This is accomplished by ordering and sending the following lab tests: 1) Type & Screen and 2) Blood Type Confirmation.

1. Non-perioperative areas: New orders for the Type & Screen and Blood Type Confirmation will display under "Orders to be acknowledged" > "New Lab Orders" on the INDEX screen for nursing until the orders are acknowledged. Note: The Blood Type Confirmation test order will not appear on the Worklist or Kardex – see workflow below.

   The following procedure occurs by the Blood Bank staff who reviews the need for the BLOOD TYPE confirmation test (the following does not apply to perioperative areas).

   a. RN verifies in EHR Blood Administration Report or Results Review that an "Blood Type Confirmation Test is Req'd" (required) with a "YES" in the Blood Types and Products section.

      i. If Blood Type confirmation test is required AND the provider order was entered, Blood Bank staff release the order for the test in EHR when there is an existing 'prepare' order to set up blood products.

      ii. Blood Bank staff will notify (by phone) the patient's RN that they have released the order so the specimen can be collected and sent to Blood Bank.

Blood and Blood Component Administration *(continued)*

b. RN verifies in EHR the test is NOT required by seeing a "NO" to the statement "Blood Type Confirmation Test is Req'd". If the provider has placed an Blood Type confirmation order, Blood Bank will not release the order since it is not needed.

- When both lab tests (Type & Screen and Blood Type Confirmation) are required, **the two blood specimens MUST be drawn with SEPARATE phlebotomies** (separate phlebotomy procedures, preferably 2 different phlebotomists, with the 2-patient identifier verification performed independently, each time). Blood Type Confirmation and Type and Screen samples drawn at the same time with a single phlebotomy are acceptable only if accompanied with an appropriately completed Yellow Attestation Card (Operating Rooms or Pre-Op) or a completed Pink Attestation Card (other clinical areas). Samples drawn by the same phlebotomist are acceptable without attestation cards ONLY if the phlebotomy draw times are ≥ 15 minutes apart. The above special protocols are in place to prevent mis-transfusions from sample labeling errors.
- See UCSF Attestation procedure for rare situations when separate phlebotomies are not feasible.

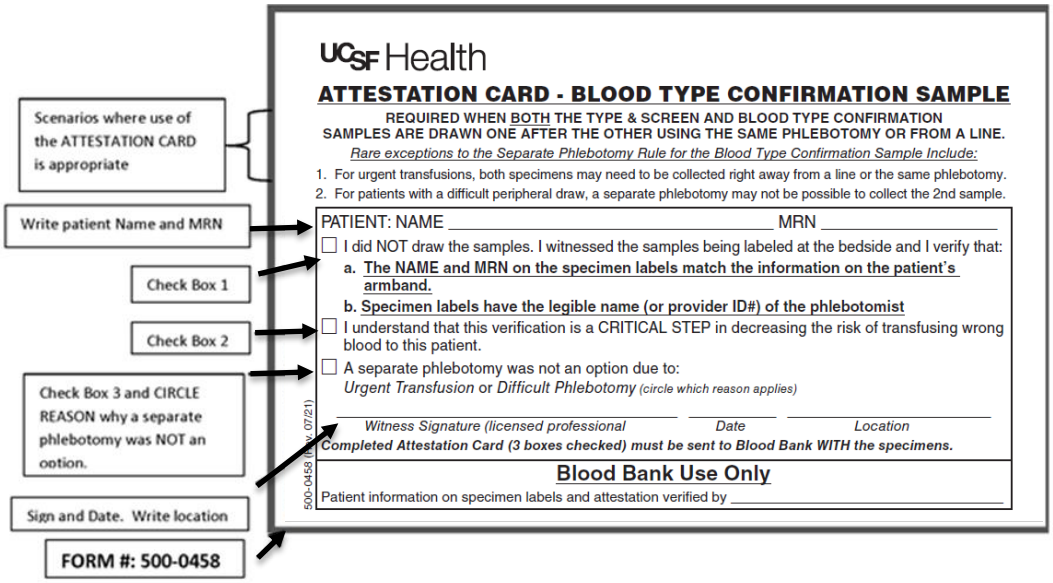
UCSF Attestation Card Procedure – Blood Type Confirmation Sample:

1. In emergency situations, and when a second phlebotomy is not possible or safely feasible, the **UCSF Attestation Card: Blood Type Confirmation Sample** is completed and signed by a second RN (or another licensed clinician) who witnessed the phlebotomy and correct labeling of the 2 samples at the bedside. This is to attest that the 2 samples came from the same patient and that the labels on the tube(s) match the patient's name and MRN.
   - Attestation Cards are stocked on the patient care units.
   - This workflow is a rare exception to the separate phlebotomy procedure and the cards are reviewed for appropriate use by the UCSF Transfusion Committee.

2. **Pink Attestation Card (Diagram 1) completion – for all non-perioperative settings**:
   a. All non-perioperative units/departments use a PINK attestation card for Blood Type Confirmation for exceptions to separate phlebotomies (*Form # 500-0458*). This card is signed by a licensed individual (e.g., RN) who witnessed the sampling and observed the bedside labeling of the samples but did not perform these activities on their own. By signing the form, the 'witness' attests that the 2 samples' label information matches the patient information and that the name/provider number of the clinician who drew the sample is on the label.
   b. Card must be completed with: Name/MRN; 3 boxes checked; circled reason for exception to separate phlebotomies; signature of witness/attester, date and location.

Blood and Blood Component Administration *(continued)*

Diagram 1: Pink Attestation Card used in non-perioperative areas



c. **Yellow Attestation Card by a SECOND licensed clinician (Diagram 2) completion - for all perioperative (Pre-op, OR, PACU) settings**:

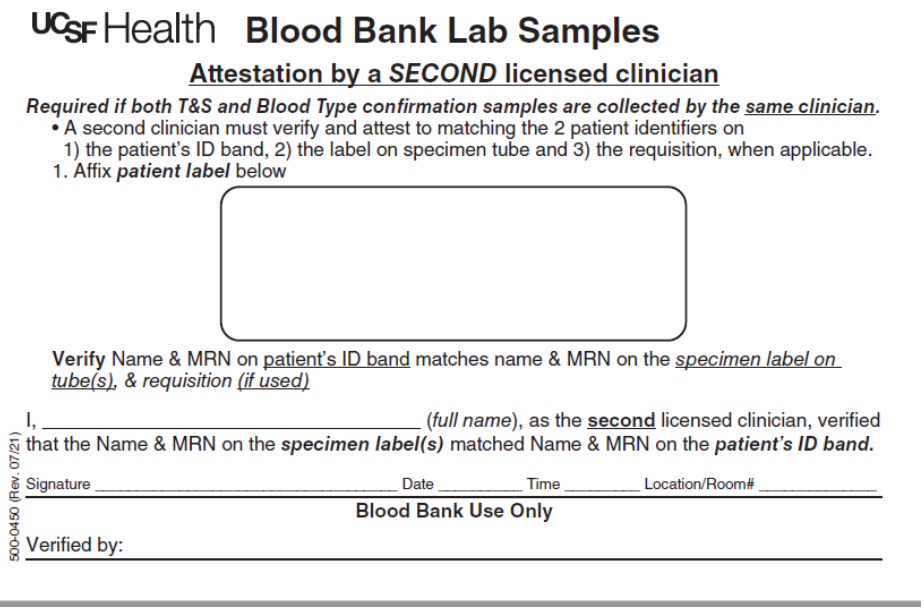
a. Perioperative/OR areas use the YELLOW attestation card when the timing of both Type & Screen and Blood Type confirmation lab samples are collected in close proximity of each other by the same clinician. (*Form # 500-0450*).

b. The attestation card is signed by a second licensed clinician (e.g., RN, MD) who attests to verifying that the name and medical record number (MRN) on the patient's ID band matches the name and MRN on the specimen label on the tube(s) and requisition (when indicated). By signing the form the second clinician attests to the matching of the patient's information on the 2 lab samples (labels and requisition, when indicated).

The attestation card must be completed with: 1) patient label affixed, 2) legible full name of second licensed clinician, and 3) signature of second clinician with 4) Date & Time and Location/Room number.

Blood and Blood Component Administration *(continued)*

Diagram 2: Yellow Attestation Card used in Perioperative/OR areas



UCSF Health **Blood Bank Lab Samples**

Attestation by a *SECOND* licensed clinician

Required if both T&S and Blood Type confirmation samples are collected by the same clinician.

- A second clinician must verify and attest to matching the 2 patient identifiers on 1) the patient's ID band, 2) the label on specimen tube and 3) the requisition, when applicable.

1. Affix ***patient label*** below

Verify Name & MRN on patient's ID band matches name & MRN on the *specimen label on tube(s), & requisition (if used)*

I, _____ (*full name*), as the **second** licensed clinician, verified that the Name & MRN on the ***specimen label(s)*** matched Name & MRN on the ***patient's ID band.***

Signature _____ Date _____ Time _____ Location/Room# _____

Blood Bank Use Only

Verified by: _____

500-0450 (Rev. 07/21)

Consent to Blood Transfusion

Process

- Informed consent for blood transfusion is required *prior to requesting all blood products* (including autologous and donor designated products) from Blood Bank and prior to administration. See Medical Center policy 6.02.04 Transfusion Information Form and Consent to Blood Transfusion.

1. Providers obtaining informed consent for transfusion are required to give the patient or his/her surrogate a copy of the information sheet entitled "A Patient's Guide to Blood Transfusion" per the Paul Gann Act and California DHS standards (paper form) or a "Your Health Matters - A Patient's Guide to Blood Transfusions" form.
2. The 2 clinician cross check for blood product administration includes VERIFICATION that a consent for transfusion of blood is present and complete in the patient's medical record (paper or scanned into EHR). The consent confirmation box should be checked off on the Blood Bank Transfusion Record.
3. The following are the UCSF blood transfusion consent forms and the consent refusal form which are all **valid for the duration of the current hospitalization for inpatients**, **and valid for one year from the signature date for outpatients**:
    - "Transfusion Information Form and Consent to Blood Transfusion" (*Form #MZ1912Z*)
    - "Authorization for Surgery, Special Diagnostic or Therapeutic Procedure, Blood Transfusion and Administration of Anesthetics" (*Form #500-0160AS* or *#500-0160BS*)
    - "Patient Refuses to Consent to Blood Transfusion Form" (*Form # 862-062Z*)

Blood and Blood Component Administration *(continued)*

Emergency Situations

- In emergency situations, blood products may be transfused without a completed informed consent.

1. The "Emergency Transfusion" box is checked on the Blood Bank Transfusion Record, when there is no consent to verify in the cross-check prior to administration.
2. The consent for transfusion should be obtained as soon as possible after the emergency situation, and before any non-emergent transfusion situations.
3. Emergency situations include indication for transfusion when the patient does not have decision-making capacity and there is no known/available surrogate.

Blood Product and Premedication Orders Review

1. Blood transfusion: Review order for transfusion prior to release of the order and again prior to administration.
   When verifying orders prior to release and administration:
   a. Click order hyperlink to view "Order Questions" section to see all order components:
      - Transfusion indication
      - Use of a blood warmer (e.g., indicated for patients with cold agglutinins disorder)
      - Special requirements: severely immunocompromised patients require special preparation of blood products (e.g., irradiated, or CMV- negative blood). These "special requirements" are a part of the blood transfusion order.
      - Transfusion volume appropriateness
        - For routine transfusions, the typical pediatric weight-based dose is 10-15 mL/kg (acceptable 5-20 mL/kg) for pRBCs, platelets, and FFP, and 1-2 units (~15-30 mL/10 kg) for cryoprecipitate.
        - Doses > 20 mL/kg in neonate and pediatric patients can cause fluid overload and should be used only in emergency and massive transfusion protocols, or for specific indications such as priming apheresis/cardiopulmonary bypass/ECMO/ECLS/CRRT circuits. Consult with provider if the volume ordered exceeds 20 mL/kg for routine transfusions.
      - Transfusion duration in hours (per unit)
   b. Premedications: Review MAR for any blood product premedication orders

Blood Transfusion Order Terminology and Definitions

1. Prepare order: order to Blood Bank to prepare or set up (allocate) blood product(s) that may be needed for transfusion (e.g., prepare 2 units PRBCs for surgery tomorrow).
   - Routine: Blood Bank prepares the blood within 4 hours
   - STAT: Blood Bank prepares the blood within 1 hour
2. Transfuse order: order to transfuse blood product(s) that were already prepared.
   - Routine: start administration as soon as available/allocated in Blood Bank (at least within 4-6 hours)
   - STAT: start administration as soon as available/allocated in Blood Bank (at least within 1-2 hours)
   - Special requirements are a part of the transfuse order and are checked prior to releasing the order and checked prior to administration (e.g., CMV negative, Irradiated, Autologous, etc.)
3. Prepare & Transfuse order: simultaneous order for Blood Bank to prepare blood and for transfusion/administration.

Blood and Blood Component Administration *(continued)*

- Routine: for prepare and transfusion start at least within 4-6 hours
- STAT: for prepare and transfusion start at least within 1-2 hours

4. Massive Transfusion Protocol (MTP):
   - **Indications –** Include, but are not limited to:
     - **Adult or larger pediatric patients (> 50 kg)** with massive bleeding requiring 4 units of PRBC in the first hour of resuscitation or replacement by transfusion of 50% of total blood volume in 3 hours
     - **Pediatric patients (< 50 kg)** with massive bleeding requiring > 20 mL/kg of PRBC in the first hour of resuscitation or replacement by transfusion of 50% of total blood volume in 3 hours
   - **How to Activate MTP –** Activated by provider order and a phone call to Blood Bank – use MTP script and procedure located in all Code Cart binders or designated locations (see Appendix D). The ordering provider enters the MTP order in EHR within 24 hours.
   - MTP activates the release of 4 units of uncrossmatched RBCs (O negative), 4 units of thawed plasma and 1 unit of apheresis platelets (1:1:1 ratio). Products are ready within 5 minutes of activation phone call. As cryoprecipitate is NOT included in the MTP packs, Blood Bank should be specifically asked to prepare this product, especially if patient is known to have low/borderline fibrinogen levels prior to the bleeding episode or if massive bleeding continues even after resuscitation with 2-3 cycles of MTP products.
   - Clinical staff must select one RN and one MD to lead other staff through massive transfusions. Follow the guidelines in Appendix for Roles during MTP/Emergency Release.
   - **Transfusion Target**
     - The UCSF Transfusion Committee, based on input from a multidisciplinary group, recommends the use of 1:1:1 ratio and standardization for all sites, recognizing that this recommendation is largely derived from clinical trials and experience in trauma settings, and that there is limited data to inform optimum ratios for massive bleeding seen in various other clinical settings.
     - As laboratory test results are not immediately available to guide therapy, the initial management of massive bleeding is empirical and largely driven by the massive transfusion protocol. Patient diagnosis, exposure to anti-platelet medications or anticoagulants, preexisting deficiencies in coagulation factors and/or platelets, and provider's clinical judgment may dictate the use of blood products in ratios other than the standard 1:1:1 ratio
     - Dosing for pediatric patients (< 50 kg) should be age and weight based and guided by clinical scenario.
     - When time permits, results of laboratory testing should also be used to guide therapy. During resuscitation, for most patients, it is reasonable to transfuse blood products to maintain hemoglobin ≥ 7 g/dL, platelets > 50 k, INR < 1.6, and fibrinogen > 100 mg/dL. Based on underlying medical conditions, different thresholds may be required for some patients.
   - **Termination –** MTP is deactivated when bleeding is brought under control and the provider determines that the patient no longer requires uncrossmatched RBCs or a large number of other blood products urgently. Unused blood products will be returned to the blood bank for restorage.
   - **Complications**
     - **Coagulopathy:** Both dilutional and consumptive coagulopathy may be seen in massively bleeding patients. Use of plasma, platelets and, occasionally, cryoprecipitate is required to achieve hemostasis. Based on clinical circumstances, the use of other hemostatic agents like tranexamic acid or coagulation factors, may be appropriate.

- **Hypocalcemia:** Since citrate is used to prevent banked blood from clotting, hypocalcemia may result during massive transfusion and may require repletion. Levels should be monitored and calcium should only be given if there is biochemical, clinical or electrocardiographic evidence of hypocalcaemia.
- **Hypothermia:** Depending on the rate and volume of the transfusions, a state of hypothermia may result from the administration of refrigerated blood products. Monitor core temperature closely and ensure that blood products are delivered with an IV warming device. External heating devices may also be necessary to maintain normothermia.
- **Hypo/ hyperkalemia:** Both hypokalemia and hyperkalemia may be associated with massive transfusion. Plasma potassium levels should be carefully monitored and treated accordingly.

- **Reporting:**

  Transfusion Service QA compiles system-wide data related to activation of massive transfusion protocol. Metrics, including number of activations and time from activation to first available blood products will be monitored and reported annually to the Transfusion QA and UCSF Transfusion Committees. Representatives from the Pediatric Perioperative Performance and Patient Safety (PIPS) Committee will be present to review pediatric activations.

5. Emergency Release Protocol
   - Activated by a phone call to Blood Bank – use Emergency Release Protocol script and procedure located in all Code Cart binders or designated locations (e.g., Anesthesia carts) (see Appendix E). The ordering provider enters the Emergency Release order in EHR within 24 hours.
   - Emergency Release Protocol activates release of a specified number of specified products. UNCROSSMATCHED RBCs (O negative) –available within 5 minutes; specified number of units of FFP or platelets within 5 minutes; and/or specified units of cryoprecipitate within 30 minutes of activation phone call.
   - Clinical staff must select one RN and one MD to lead other staff through massive transfusions. Follow the guidelines in Appendix for Roles during MTP/Emergency Release.

Blood Product Availability in EHR and Obtaining Product from Blood Bank

1. **PRIOR to RELEASING an order for a blood product** (to obtain blood product for transfusion):
   a. Verify **consent** for transfusion is present in chart (paper or scanned into EHR).
   b. Verify transfuse order including special requirements.
   c. Ensure patient is “ready for transfusion”: IV access available; indication for transfusion is known and still present (contact provider if unclear); patient available on unit (no competing procedures/transports); and premedications given or ready to administer, if ordered.
   d. Review the readiness of blood products in the Blood Bank per the following procedure.
2. Access the Blood Transfusion Report from:
   - Patient summary activity or
   - Blood Administration flowsheet (titled “Release Transfusion Report” when blood products available)
3. Follow STEPS 1 through 4 outlined in the Transfusion Report:

Blood and Blood Component Administration *(continued)*

STEP 1: "Do blood bank labs need to be sent?"

- Review Type & Screen expiration date to ensure it is not expired. If DATE in column is not passed (expires at midnight), there is no need to send this lab test before requesting red cell blood products.
- For non-RBC products (platelet, plasma/FFP, or cryoprecipitate), a current Type & Screen is not required. However, a confirmed Blood Type (at least 2 Blood Type results in UCSF system) is required and for plasma orders, at least one Blood Type should have been done within the preceding 2 months.
- Review Blood Type Confirmation test required – "NO" means no need to send this lab test before requesting ANY blood products.

STEP 2: "Is the blood ready?"

- Review list of Blood Product Results (last 72 hours) present.
- Review "Unit Status" column adjacent to blood component type to identify "ALLOCATED" status, which indicates blood products that are ready to leave Blood Bank. ALLOCATED status products are available/ready to be sent or picked up for transfusion. Instead of 'ALLOCATED', the status of plasma products may be displayed by a '***Yes, Send Pick Up'*** comment next to the Plasma –Units Ready column. These products are ready to be sent or picked up.

STEP 3: "When blood is ready, release and print pick-up slip"

- Identify transfuse order for blood product(s) to be obtained from Blood Bank and select "Release" hyperlink. This Release step should only be done after confirming the products are ALLOCATED. This alerts the Blood Bank that the product(s) are being requested for transfusion.
- Select "Generate Blood Product Pick-up Slip" hyperlink adjacent to specific product transfusion order in next section on Transfusion Report.
    - Complete electronic Pick-up Slip by answering the questions: 1) How many units/volume are you requesting? 2) Location where you want the blood sent if not picking up from Blood Bank; and 3) Pick-up Method: Robot, Pneumatic Tube or Pick-up from Blood Bank.
    - Print out of Pick-up Slip is generated to a local printer on unit/dept. for clinician/designee to use to pick up blood from Blood Bank. This pick-up slip should be signed (with time received noted) and sent back to Blood Bank upon receipt of blood products via pneumatic tube system. See STEP 4 if an extra pick-up slip is needed for printing.
    - Time expectation for delivery/availability for pick up: Robot is 1-2 hours, Pneumatic tube is 1 hour, and pick up from Blood Bank is 15 minutes from the time the pick-up slip transmission is received in Blood Bank.

STEP 4: If extra pick-up slip is needed

- When requesting cooler for FFP/Plasma infusions: Select "EXTRA Pick-up Slip" hyperlink in Blood Transfusion Report hyperlink to PRINT a generic pick-up slip to completely fill out and bring it to Blood Bank to obtain a cooler of blood products.
- For other transfusions, the "EXTRA pick-up slip" should only be used when the linked product pick-up slip is lost or fails to print. The "EXTRA Pick-up Slip" (on-demand pick-up slip) is found in the Blood Transfusion Report. It should be completely filled out, **including the special requirements section which is a part of the transfuse order for the product.** If any information is missing or discrepant from the actual order, Blood Bank will reject and ask for a new pick up slip before releasing blood.

Blood Product Delivery and Storage

ROBOT DELIVERY

When robot arrives at nursing station do the following:

1. Open door on front of robot - the number code is 1313
2. Remove blood products intended for your unit/patient(s)
3. Inside, RBCs or FFP are kept in the cooler and platelets and cryoprecipitate are stored on an open shelf
4. Complete Robot Blood Issue Log for appropriate patient, unit number, and donor number. Sign log with full signature and time received
5. Close and latch robot door
6. Press green ENTER button and robot will continue to its next stop
7. Do not send specimens or requisitions to the laboratory in the robot

COOLER MANAGEMENT FOR TEMPORARY STORAGE

Coolers have different temperature ranges specific to the blood product type:

1. Follow instructions on the coolers. RBCs, Whole blood (WB), and FFP should not be stored together in the same cooler. Some large coolers may allow RBCs and plasma to be stored in separate compartments, in the same cooler.
2. Do not store platelet and cryoprecipitate products together with other blood product types in a cooler. - Platelets and cryoprecipitate are stored at room temperature and require their own soft-sided insulators/transport bags.
3. Maximum cooler capacity for the type and number of product units is located on the label at the end of each cooler.
4. If cooler contains uncrossmatched products, an orange placard noting “Emergency Release Un-Crossmatched Blood Product” will be attached to cooler to alert clinicians.
5. Cooler expiration is posted on the outside of each cooler.
    - The cooler expiration is always earlier than the expiration date of the shortest dated product in the cooler.
    - Blood products left in coolers after the expiration date/time will be out of temperature range rendering them unusable and the product will be wasted as Blood Bank is required to discard out of temp products.
5. Blood Bank tracks blood products and coolers, and accounts for their usage/transfusion. Unless there is an absolute medical necessity, blood products issued to one location should not be moved to another location if a patient is transferred. If there is an urgent need, following good hand-off practices, patients may be transferred to another location while products are infusing. However, remaining products should be returned to the Blood Bank, and new pick-up slips sent to Blood Bank from the new location to request additional products. These measures are in place to minimize risk of mistransfusion.
    - In rare cases when it is necessary to transfer blood products from one unit to another along with the patient (e.g. ICU to OR transfer for an emergency), Blood Bank must be notified.

Blood and Blood Component Administration *(continued)*

PROCEDURE FOR COOLER USE IN CLINICAL AREAS

When using coolers to store blood products in a clinical area do the following:

1. Keep coolers closed when not removing products to maintain acceptable temperatures.
2. Do not disrupt frozen ice blocks, gel coolant packs, and spacers within cooler.
3. Refer to the "UCSF Blood Bank Coolant Placement" diagram located on top of cooler for placement of frozen blocks, gel packs, and blood products.
4. Review identifier label located on outside of cooler for patient name (last, first initial) and unit/dept. location. Ensure name matches patient in unit/dept.
5. Check cooler expiration date and time on the card posted on outside of cooler.
6. Return cooler with products to Blood Bank if expiration date/time is approaching.
    - Return at least 30 minutes before expiration time to allow Blood Bank enough time to provide replacement coolers.
7. Return coolers to Blood Bank when empty and/or not needed any longer.
8. Wipe down the outside of all returned coolers with approved wipes for infection control purposes.

RETURNING BLOOD PRODUCTS TO THE BLOOD BANK

1. Infusions, once started, must be completed within **4 hours.**
2. All blood products that are NOT administered must be returned to Blood Bank.
3. Blood Bank will correct their records so that the unit does not incorrectly show as 'transfused'. However, even if a very small amount of blood may have been transfused (e.g., <1 mL), it is considered 'transfused' and should not be returned to the blood bank unless there is a transfusion reaction.
4. If blood is not going to be administered, return it **immediately** to Blood Bank as products (not in coolers) very quickly go out of range of acceptable temperature and get discarded.

RELEASE OF BLOOD PRODUCTS WITH 'SHORT-DATED" EXPIRATION TIME FROM BLOOD BANK

1. A short-dated blood product is one with an expiration time within the next 1-2 hours (e.g., for Cryo, FFP, washed RBCs, plasma reduced platelets, or any other product close to its midnight expiration time).
2. Blood Bank staff will call the unit and speak to the patient's RN to reveal the impending expiration time and verify acceptance of the short-dated expiration time product.
    - Acceptance indicates that administration of the blood product can begin before expiration time. As long as the transfusion is *started* before the expiration time, it is OK. Transfusion may be completed *after* the expiration time.
    - If, due to clinical or other reasons (e.g., limited IV access, procedures, off unit, etc.), blood product administration may not start by the expiration time, the RN will communicate this to Blood Bank so they prepare a different product with longer-expiration time.

Administration of Blood Products

STEPS PRIOR TO OBTAINING BLOOD PRODUCTS FROM BLOOD BANK

1. Verify order for blood product transfusions, and review the indication for the transfusion; if indication is unknown or unclear based on patient status, contact provider for clarification
2. Review chart for transfusion consent
3. Review MAR for any pre-medications for blood transfusions

Blood and Blood Component Administration *(continued)*

4. Review IV access available for transfusion(s)
   - **ADULTS**: CVC or peripheral IV (PIV) – preferably a 22-gauge or larger catheter; or Intraosseous (IO) needle access
   - **INFANTS and PEDIATRICS**: PIV or CVC (1.9 Fr and larger bore)
   - **NEONATES**: PIV is preferred site. In an emergency, and with attending physician's order, may administer through a CVC/umbilical artery catheter
5. Provide patient/family education regarding blood transfusion (indication, procedure, monitoring, and potential signs/symptoms of reactions to report)
6. Plan for administration of one blood product at a time, with the exception of emergent situations (e.g., active bleeding, resuscitation)

➔ **TIP:** Prefer seeing a video? View Blood Administration Video or scan this QR code:

TRANSFUSION CROSS CHECK – USING EHR

Blood products are cross checked and administered by the following licensed staff/providers at UCSF:

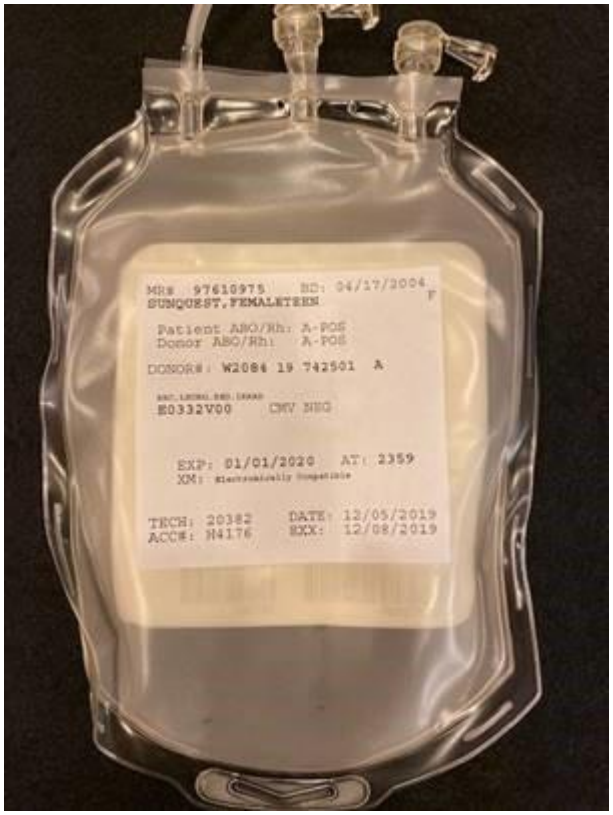
RN, MD, NP, PA, and certified perfusionists or autotransfusionists.

1. VERIFY CONSENT: Both clinicians verify that the transfusion consent form is present in the medical record.
   a. For emergency situations when there is EHR downtime and no signed transfusion consent, check the "Emergency Transfusion" box on the Blood Bank Transfusion Record.
2. VERIFY ORDER: Immediately before blood product is transfused, BOTH clinicians verify transfusion order(s) for blood products that are cross checked.
   a. Use the Blood Administration Flowsheet in EHR to review the order for any Special Instructions and for Special Requirements (preparation) of blood products.
   b. Both clinicians cross check provider order against the Blood Product label (Figure A below) to ensure that all Special Requirements are met (e.g., Irradiated, CMV negative, autologous, etc.).
3. At BEDSIDE: Both clinicians perform the 2-patient identifier check:
   a. One clinician reads aloud the name, medical record number, and date of birth on patient's wristband (or for outpatients, 2-patient identifier with self-report from patient).
   b. The second clinician verifies accuracy (matching) of name, medical record number, and date of birth on Blood Order label (Figure B below).

Blood and Blood Component Administration *(continued)*

Figure A: Blood Product Label

Figure B: Blood Order Label



4. At BEDSIDE: Both clinicians cross check the Blood Product label using **EHR**:
    a. Locate the blood product group (use group status, date and time to select correct group)
    Blood Transfusion Group Statuses may include:
        i. **Ordered**: displays when blood product released/pick-up slip generated
        ii. **Transfusing**: displays when blood documented as "started"
        iii. **Stopped**: displays when "0" is entered in rate row
        iv. **Completed**: displays when transfusion group completed
    b. From the Blood Administration Flowsheet, click the "Begin Blood Transfusion**"** button (after order is released and product has been received).
        I. In the pop-up window, select the blood product to be transfused (platelets, pRBCs, etc.)
        II. If starting a new transfusion with the **SAME** blood product unit (donor) number prior to stopping a current transfusion with the **SAME** unit number (e.g. continuous FFP transfusions), an additional pop up window will appear. Click on the desired product button under "Products for a New Transfusion"
    c. Complete 2 RN verification process of blood product:
        i. Scan the patient's ID band
        ii. Scan the unit number
        iii. Scan the product code

Blood and Blood Component Administration *(continued)*

iv. Compare blood product label to EHR
- Patient blood type (patient type should be compatible with that of blood product; (see Appendix A)
- Expiration date and time (transfusion must *start* before expiration time)
- Special requirements (e.g., RBC, irradiated, pre-filtered if sent in syringe)

v. Look for the  Ready! Icon

vi. Enter rate (mL/hr) if applicable

vii. Complete verification questions

viii. Enter or link vital signs (must be within 1 hour before transfusion)

ix. Click "Accept"

d. For RBC products ONLY (does not apply to platelet, plasma or cryoprecipitate), the blood product label shows results of cross match testing performed. Verify cross match results are acceptable (see chart in Appendix A).

e. Prior to administration and at the bedside, check appearance of the blood product and return any unit to Blood Bank that is discolored, foaming, bubbling, has abnormal cloudiness, presence of clots or loss of integrity of the bag.

f. If any of the information in the cross check does not match or is inaccurate:

i. Special requirements do not match - call primary team for order clarification

ii. For other discrepancies call Blood Bank immediately – do not administer and follow Blood Bank staff directions

iii. Document note on the Transfusion Record

5. SIGN Second clinician should click "Sign Off" and enter their login credentials in the User Authentication Screen
6. PAPER COPY: To be used for EHR downtime, emergency release and MTP scenarios (See Downtime on Paper Form). File the paper copy in the patient's chart if used; if not used discard in secure waste bin.

TRANSFUSION CROSS CHECK – DOWNTIME ON PAPER FORM ONLY

Blood products are cross checked and administered by the following licensed staff/providers at UCSF:

RN, MD, NP, PA, and certified perfusionists or autotransfusionists.

1. VERIFY CONSENT: Both clinicians verify that the transfusion consent form is present in the medical record; for emergency situations when there is EHR downtime and no signed transfusion consent, check the "Emergency Transfusion" box on the Blood Bank Transfusion Record.
2. VERIFY ORDER: Immediately before blood product is transfused, BOTH clinicians verify transfusion order(s) for blood products that are cross checked.
   a. Review the order for any Special Instructions and for Special Requirements (preparation) of blood products (use the Blood Administration Flowsheet in downtime EHR record if available).
   b. Both clinicians cross check provider order against the Blood Product label to ensure that all Special Requirements are met (e.g., Irradiated, CMV negative, autologous, etc.).
3. At BEDSIDE: Both clinicians perform the 2-patient identifier check:
   c. One clinician reads aloud the name, medical record number, and date of birth on patient's wristband (or for outpatients, 2-patient identifier with self-report from patient).

Blood and Blood Component Administration *(continued)*

d. The second clinician verifies accuracy (matching) of name, medical record number, and date of birth on Blood Order label.

4. At BEDSIDE (DOWNTIME ONLY): Both clinicians cross check Blood Order label with Blood Bank Transfusion Record:
    a. One clinician reads aloud the following information on the Blood Order label while the second clinician verifies accuracy (matching) of data on the Blood Bank Transfusion Record, and expiration date/time is not exceeded:
        i. Patient name
        ii. Medical record number
        iii. Date of birth
        iv. Patient Blood Type type
        v. Donor Blood Type type
        vi. Donor # including all letters and numbers
        vii. Blood product type with special preparation details (e.g., RBC, irradiated, pre-filtered if sent in syringe)
        viii. Expiration date and time (transfusion must *start* before expiration time)
    b. Both clinicians verify the front and back labels on blood product match regarding:
        i. Donor Blood Type type
        ii. Donor # including all letters and numbers
        iii. Expiration date/time
    c. For RBC products ONLY (does not apply to platelet, plasma or cryoprecipitate), the Blood Order label shows results of cross match testing performed. Verify cross match results are acceptable (see table below).
    d. Prior to administration and at the bedside, check appearance of the blood product and return any unit to Blood Bank that is discolored, foaming, bubbling, has abnormal cloudiness, presence of clots or loss of integrity of the bag.
    e. If any of the information in the cross check does not match or is inaccurate:
        i. Special requirements do not match - call primary team for order clarification
        ii. For other discrepancies call Blood Bank immediately – do not administer and follow Blood Bank staff directions
        iii. Document note on the Transfusion Record
    f. SIGN Blood Bank Transfusion Record: both clinicians sign the top section of the Blood Bank Transfusion Record.
    g. COMPLETE the pre-transfusion cross check and 2-RN verification.
    h. PAPER COPY Put paper copy in patient's medical record.

ADMINISTERING BLOOD PRODUCTS

1. DOCUMENTATION in APeX
    a. Keep "Blood Administration" window open (see above for "Transfusion Cross Check" window).
2. PREPARE TUBING: Select appropriate transfusion IV tubing (with filter) and prime tubing either directly with blood product or with normal saline solution (0.9% NaCl) prior to priming with product.

Blood and Blood Component Administration *(continued)*

a. Blood products are compatible with normal saline – do not co-administer with dextrose-containing, Lactated Ringer's or medication solutions. If transfusion IV tubing is "piggy-backed," "y-sited," or connected to a stopcock, the main line tubing must only contain normal saline solution.
b. Filter all blood products that are not pre-filtered by Blood Bank during administration.
c. Albumin, immune serum globulin, and Factor VIII and Factor IX concentrates **do not** require filters for administration.
d. Maximum volume that may be ordered as a pre-filtered blood product from the Blood Bank is 50 mL, which will be issued in a luer lock syringe.
e. Change transfusion IV tubing every 4 hours or after 2 blood product transfusions.
f. **PEDIATRIC:** Caution with FFP and platelets for Pediatric patients: FFP and platelet products should never be administered by IV push or rapid infusion for volume replacement due to potential complications of citrate-related hypocalcemia.

3. TRANSFUSE BLOOD PRODUCT(S). (Refer to Appendix H: Blood Administration Reference)
   a. Infusion should be started slowly (see infusion rates in Appendix H) with **close observation** by transfusionist during the first 15 minutes. Continuous observation is indicated if the recipient is at a greater risk of fluid overload, has experienced previous reactions, or is unstable prior to start of transfusion. Consider continuous observation if patient is naïve to transfusion of blood products.

      If no signs of a reaction after 15 minutes, flow rate may be increased to ensure completion of transfusion within 4 hours of spiking, taking into consideration patient's size/blood volume, fluid status, and hemodynamic condition.
   b. Perform more frequent assessments during and after transfusions as necessary based on change in clinical status or any sign or symptom of transfusion reaction.
4. DOCUMENT IN EHR
   a. Date, time transfusion started, and clinician who started transfusion (captured with date/time column).
   b. Date, time transfusion completed, and clinician who completed transfusion.
   c. Document vital signs (BP, HR, RR, temperature, pulse oximeter saturation) within 1 hour prior to start of transfusion, then 15-minutes after start of transfusion, and when transfusion is ended.
      i. Volume transfused: Enter in appropriate blood product row (PRBC, FFP, platelets, cryoprecipitate); once transfusion is ended, document stopping transfusion by entering "0".
      ii. Reaction suspected (Enter "YES" only if reaction suspected, otherwise leave blank).
      iii. Complete blood transfusion group.
5. Documentation with PAPER FORMS: If using paper Blood Bank Transfusion form for EHR downtime or Massive Transfusion Protocol, document the following:
   a. Date, time transfusion started, and clinician who started transfusion.
   b. Date, time transfusion completed, and clinician who completed transfusion.
   c. Vital signs for: a) pre-infusion; b) 15 minutes after start; and c) end of transfusion.
   d. If MTP, enter number of units transfused for each type of blood product (e.g. 12 units pRBCs).
   e. If Emergency Release, enter Volume transfused in milliliters (mL).
   f. Reaction suspected (yes or no).
   g. Place form in medical record.

h. For MTP/Emergency release: Document total volumes after infusions are complete. In flowsheet or narrator, select "yes" to question regarding MTP/Emergency release, and then document for each type of blood transfusion volume(s).

PATIENT MONITORING DURING BLOOD PRODUCT TRANSFUSION

1. TRANSFUSION REACTION(S): Monitor for signs of potential transfusion reactions (see Signs of Transfusion Reaction) during and after blood product administration.
2. TRANSPORT: RNs monitor patients if they need to leave the clinical department/unit for intrahospital transport, including time at off unit diagnostics and procedures. Anesthesia providers also monitor patients with transfusions during intrahospital transport.
3. Peri-transfusion vital signs documentation for specified ICU situations:
   a. Vital signs may be entered into EHR doc flowsheets instead of Blood Transfusion Record when patients are in ICU on continuous infusions of blood products (typically FFP, but may include PRBCs) or are receiving multiple products simultaneously during active bleeding resuscitation.
      - This applies to ICU patients with continuous monitoring of HR, RR, BP, and Sp02, and continuous or at least hourly temperature monitoring, who are receiving continuous infusions and/or multiple infusions at the same time during resuscitation.
      - Validated vital signs are entered into EHR for patients receiving FFP infusions at least hourly (including temperature).
      - Validated vital signs during active bleeding resuscitation is at least every 15 minutes (this must include continuous temperature monitoring or every 15 minute intermittent.
   b. For these specified conditions, RN writes the comment "See EHR" in the vital signs section of the Blood Bank Transfusion Records.

DISCHARGE & PATIENT INSTRUCTIONS AFTER BLOOD TRANSFUSION

1. Discharge patients from inpatient or outpatient units no sooner than 1 hour after end of the blood transfusion.
2. Provide patient education, including signs and symptoms of a delayed transfusion reaction.
   a. Give patient the "Outpatient Instructions after Blood Transfusion" form (*form #500-0296*).
   b. Provide instructions to call the provider or clinic if experiencing any signs of a delayed transfusion reaction.
   c. Place copy of form in the medical record.

Suspected or Actual Transfusion Reaction - Protocol

SIGNS OF TRANSFUSION RELATED REACTIONS

1. Monitor patients for signs of transfusion related reactions and complications including acute hemolytic reactions, allergic reactions, febrile reactions, fluid overload and transfusion related acute lung injury (TRALI) during and after the transfusion.
2. Watch for the following signs and symptoms:
   - Chest pain
   - Shortness of breath, stridor, laryngospasm, crackles, frothy sputum
   - Rise in body temperature of ≥ 1 ˚C, irrespective of baseline temperature value
   - Shivering/rigor or complaints of chills

- Urticarial/hives, rash, or pruritus
- Facial, orbital, tongue or airway edema
- Complaints of headache, nausea
- Complaints of acute anxiety
- Severe back or loin pain
- Hematuria
- Significant change in vital signs (BP, HR, RR, oxygen saturation)
- Signs of acute fluid overload (e.g., frothy sputum / pulmonary edema on x-ray, crackles on breath sounds, hypoxemia, respiratory distress, elevated cardiac filling pressures, elevated blood pressure)

PROCEDURE FOR SUSPECTED AND ACTUAL REACTIONS

For suspected transfusion reaction or presence of signs of transfusion reaction, do the following:

1. Stop transfusion(s)
2. Maintain IV access with normal saline infusion at TKO rate
3. Assess patient for signs/symptoms of transfusion reaction and check vital signs
4. Review blood bag label and compare the patient identifiers to patient's arm band
5. Notify patient's provider immediately and discuss plan of care
    A. If provider suspects a transfusion reaction AND asks to discontinue transfusing remaining product:
        - Activate transfusion reaction protocol and notify Blood Bank
        - **Note:** Patient may develop symptoms concerning for a transfusion reaction after the completion of transfusion. In such cases, if provider suspects a transfusion reaction, activate transfusion reaction protocol, notify Blood Bank, and return blood bag and tubing to Blood Bank (see #7, below)
    B. For a restricted sub-set of milder reactions, the provider may decide to administer medication, manage symptoms and resume transfusion of the remainder of the product
        - For self-limited **allergic** reactions (symptoms limited to localized urticaria/rashes/pruritus; no upper/lower airway involvement or hypotension), it is acceptable to stop transfusion, administer medication, and if symptoms have largely resolved, resume transfusion at a slower rate
        - For self-limited febrile reactions to **pathogen reduced platelets**: Following clinical assessment of the patient, it may be reasonable to infuse the remainder of the product (at a slower rate and closer observation), if the provider determines that the patient is stable and there is no clinical concern for a septic transfusion reaction
        - If the initial rise in temp is ≥ 2° C: if fever recurs after resuming transfusion, or if patient experiences other significant changes in vital signs, transfusion should be stopped, transfusion reaction protocol activated and product returned to the blood bank
6. Activate Transfusion Reaction Protocol:

Blood and Blood Component Administration *(continued)*

- Nursing to enter order for normal saline TKO infusion and blood sample to send to Blood Bank: Follow instructions in order from the Kardex and Active Orders Report to "Activate Transfusion Reaction Protocol"
- Go to Manage Orders. Search orders for "Blood Transfusion Reaction (Nsg/Allied Health)" and open order
- Enter TKO rate (Dose) into Normal Saline Order (e.g., in an adult patient enter 10 mL/hr.) and ACCEPT
- Answer all required questions
- Sign order using "Per Protocol – No Cosign required" and use attending physician's name to enter order
- Print and return to Blood Bank: *"Report of Possible Transfusion Reaction"* requisition after order is signed

7. Return to Blood Bank: all blood bags and IV solutions *and* administration set(s) used with product administration; dispose of any sharps/needles that may have been used before sending to Blood Bank
8. DRAW AND SEND LAVENDER TUBE: Obtain a specimen of patient's blood. Do the following:
   A. Collect carefully collected to avoid hemolysis (e.g. slow aspiration to fill syringe, use transfer device with syringe to fill **6 mL EDTA lavender top tube**
   B. Blood sample must have a label with patient's full legal name and MRN and must be signed, dated, and timed (sample draw date/time) by the phlebotomist/RN/MD (full legible name, initials or MD provider number).
   C. While a signature and hand-written date and time are not required when specimens are collected and labeled using barcode lab labeling with Collection Manager, the printed label should display all information correctly.
   D. The sample should be marked "post-transfusion reaction"
   E. Send to Blood Bank
9. WHEN TO COLLECT URINE: If a hemolytic reaction is suspected, provider should order a 'urinalysis with microscopy' in EHR. Obtain and send a first post-transfusion urine specimen to the clinical laboratory. Urine samples are not needed routinely and are ONLY indicated when a hemolytic reaction is suspected
10. DOWNTIME ONLY: Fill out "Report of Possible Transfusion Reaction" form (*form #705-033*) located on unit/department; include signature of reporter and name of provider notified
11. Place original form (white copy) in paper chart. Send yellow copy to Blood Bank together with unused products and other items (listed above)
12. If not already done, document "YES" to suspected reaction on Blood Bank Transfusion Record or in EHR

Troubleshooting

Problem	Suspected issue	Action
Mismatch between expected blood product and label on blood bag	• Possible administration of inappropriate blood products	• Stop transfusion (if already begun) • Notify provider

Blood and Blood Component Administration *(continued)*

		• Notify Blood Bank • Document in EHR and Incident Report
Unable to scan blood into EHR	• Equipment malfunction • Mislabeled bag or unreadable barcode	• Report malfunction to unit director and place ticket with IT help desk for repair 415-514-4100 • Contact Blood Bank to verify error if bag label at issue; complete Incident Report
Leaking bag of blood products	• Some bags of blood products, e.g. psoralen treated platelets, may leak	• Stop infusion and return all unused products and tubing to Blood Bank • Notify provider • Document in EHR and Incident Report

References

Level of Evidence (FAME*)	Level*	Reference
	E4	*UCSF Clinical Laboratories Manual*. (2018). Accessed October 22, 2018 from Transfusion Medicine Guide | UCSF Clinical Laboratories.
	E4	AABB. (2018). *AABB Standards for Blood Banks and Transfusion Services*, 31st Ed. Bethesda: MD.
	E4	AABB. (2017). *AABB Technical Manual*, 19th Ed. Bethesda, MD
	E4	AABB. (2012). *AABB Neonatal Transfusion Guidance*. Bethesda, MD.
	E4	INTERCEPT Blood System for Platelets, pathogen reduction system. (2018). Accessed Oct 22, 2018 from INTERCEPT product description.
FAME Scale details: See nursing policy *Policy, Procedure, & Competency Development, Review, & Approval*		

Procedure History

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Originated:	9/85
Resources:	Ben Tanner, RN, MSN, CNS; Adult & Pediatric CNSs
Reviewed:	6/13: Approved by the Patient Care Standards Committee & the Blood Bank Transfusion Committee 4/17: Approved by the Patient Care Standards Committee

Blood and Blood Component Administration *(continued)*

Reviewed / Revised: 9/97, 5/98, 2/99, 9/01, 9/03, 6/06, 10/06, 8/07, 8/09, 12/09, 3/12, 8/12, 10/12, 6/13, 4/15

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10/17: Benjamin Tanner, RN, MSN, CNS (only Appendix D & E)

9/18: Lisa Tsang, RN, MN, CNS; Ben Tanner, RN, MSN, CNS (Admin of blood products III. B. & Appendix H)

2/19: Benjamin Tanner, RN, MSN, CNS

6/19: Benjamin Tanner, RN, MSN, CNS; Lisa Tsang, RN, MN, CNS; Ashok Nambiar, MD

3/20: Benjamin Tanner, RN, MSN, CNS; Ashok Nambiar, MD (Appendix H: Granulocytes)

3/20: Benjamin Tanner, RN, MSN, CNS (administering blood products for patients with isolation precautions)

9/20: Benjamin Tanner, RN, MSN, CNS; Lisa Tsang, RN, MN, CNS; Ashok Nambiar, MD

3/21: Benjamin Tanner RN, MSN, CNS; Lisa Tsang, RN, MN, CNS; Ashok Nambiar, MD

10/21: Benjamin Tanner RN, MSN, CNS; Lisa Tsang, RN, MN, CNS; Ashok Nambiar, MD; Lan Vu, MD (addition of pediatric MTP content)

1/22: Benjamin Tanner RN, MSN, CNS; Lana King, RN, MSN; Ashok Nambiar, MD

Appendix A: Blood Type Compatibility Chart and RBC Cross-Match Chart

BLOOD TYPE COMPATIBILITY CHART			
Recipient Blood Type	**Donor Blood Types**		
	Red Cells	**Whole Blood**	**Plasma**
O +	**O + or O -**	**O + or O -**	**O; A; B or AB**
O -	**O -**	**O -**	**O; A; B or AB**
A +	**A +; A -; O + or O -**	**A + or A -**	**A or AB**
A -	**A - or O -**	**A -**	**A or AB**
B +	**B +; B -; O + or O -**	**B + or B -**	**B or AB**
B -	**B - or O -**	**B -**	**B or AB**
AB +	**AB +; AB -; A +; A -; B +; B -; O + or O-**	**AB + or AB -**	**AB**
AB -	**AB -; A -; B -, or O -**	**AB -**	**AB**

Cross-Match: Description of Cross-Match Test on RBC Product Label

Compatibility	Acceptable	Comments
Common descriptions		
Compatible	YES	
Coombs Compatible	YES	
Electronically Compatible	YES	
Blood of Compatible Type	YES	1. Used commonly for RBCs issued for infants < 4 months 2. Also used for Blood Type compatible RBC units issued to massively bleeding patients requiring > 12 units.
Used for Emergency Release RBCs /MTP		
Emergency Issue, Compatibility Unknown	YES	Used only when Emergency Release/MTP has been activated
Used only in special circumstances		
Least Incompatible	YES	OK only for patients with autoantibody problems like warm/cold autoimmune hemolytic anemia. All units are 'least incompatible' because of interference from the autoantibodies.
Compatibility Unknown	YES	1. Units are ABO-compatible, but Rh positive. Units with this label may be issued to Rh negative massively bleeding patients or during severe shortage of Rh negative RBCs. 2. May also be used for units that are Blood Type compatible, but not necessarily negative for one or more minor RBC antigens. 3. Typically used for massively bleeding patients (with RBC antibodies), needing > 12 units.

Appendix B: Special Considerations for Neonates

ALL Neonates:

- The preferred method of administration of blood products is through a dedicated peripheral IV.
- In patients with limited vascular access, blood products may be administered through an umbilical venous catheter (UVC) or large bore (1.9 Fr and larger) central venous catheter (with x-ray confirmation of appropriate catheter tip placement). An order by the Attending/Fellow is required to administer blood products through a UVC or central venous catheter.
- In emergencies, blood products including PRBC, WB, FFP, PLTS, and washed cells may be administered through an umbilical arterial catheter (UAC) with an order by the Attending/Fellow. X-ray confirmation of catheter tip placement between T6-T9 or L3-L4 must be obtained prior to administration of blood products.

ICN

- Infants less than 4 months of age should receive only CMV negative and irradiated packed red blood cells, whole blood, platelets, and white blood cells (see UCSF Clinical Laboratories Manual).
- During the cross-check of blood products, collection date is also checked to verify product is less than 21 days old. The ICN Fellow or Attending must be notified prior to transfusion if the blood product is greater than 21 days old.
- Blood products are administered via a luer-lock syringe pump system.

Appendix B updated 2018 by*:* Jeannie Chan, MS, RN, CNS; Elizabeth Papp, MSN, RN, CNS; Mary Kay Stratigos, BSN, RN-NIC

Appendix C: Blood Administration in the Operating Room

Procedure

1. Verify that a completed consent for transfusion of blood is present in the medical record. Blood products should not be requested from the Blood Bank until consent for transfusion has been obtained, with the exception of emergency situations.
2. Check EHR (Procedure Blood) to verify active Type & Screen, Blood Type Confirmation, and to review blood product availability. In Procedure Blood Report, blood products with “unit status” designated as “Allocated” are available to leave the blood bank.
3. Determine type and number of blood product units necessary for the case with the surgical team.
4. Cross-Check of Blood Products: Before transfusion is started all blood products are cross-checked by two licensed and/or certified personnel (MD, RN, PA, NP, Certified Clinical Perfusionist [CCP], or Certified Autotransfusionist) for the following:
    a. Both clinicians verify the transfusion consent form is present (paper or scanned) in the medical record. For emergency situations when there is no signed transfusion consent, check the “Emergency Transfusion” box on the Blood Bank Transfusion Record.
    b. Both clinicians perform the 2-patient identifier check: One clinician reads aloud the name, medical record number (MRN), and date of birth on the patient’s wristband and the second clinician verifies accuracy and matching against the name, MRN, and date of birth on the blood product bag label AND on the Blood Bank Transfusion Record.
    c. Both clinicians: Cross-check of blood product label and Blood Bank Transfusion Record data: One clinician reads aloud the following information on the blood product label, while the second clinician verifies accuracy (matching) against the Blood Bank Transfusion Record and that the product is not expired and will not expire before start of transfusion:
        i. Patient name
        ii. Medical record number
        iii. Date of birth
        iv. Patient Blood Type type
        v. Donor Blood Type type
        vi. Donor # including all letters and numbers
        vii. Blood product type with Special Requirements of provider order (e.g. CMV negative, irradiated, pre-filtered if sent in syringe)
        viii. Expiration date and time (transfusion must start before expiration time)
    d. Both clinicians verify the front and back labels on blood product match regarding:
        i. Donor Blood Type type
        ii. Donor # including all letters and numbers
        iii. Special requirements (e.g. irradiation, CMV, etc.)
        iv. Expiration date/time

Blood and Blood Component Administration *(continued)*

e. Both clinicians cross check.

f. For RBC products ONLY (does not apply to platelet, plasma or cryoprecipitate), the blood product label shows results of crossmatch testing performed. Verify crossmatch results are acceptable (see Appendix A).

g. If any discrepancies between the Blood Transfusion Record and the blood bag label are present, notify Blood Bank immediately and return the blood product and Transfusion Record to Blood Bank.

h. Both clinicians sign the Blood Bank Transfusion Record.

- Transfusion Record: remains with the blood product until the product is spiked for administration; once the transfusion is completed it is placed in the patient's chart.

5. Storage of Blood Products in OR: Blood products remain in their cooler (RBC and platelet) or soft-sided insulator (platelet and cryoprecipitate) until administered in order to maintain acceptable product temperature. *For red blood cells this is 1-10˚C, and for platelets and cryo it is 20-24˚C.*

6. An electronic "Prepare" order is entered into EHR by OR personnel to order preparation of blood products in Blood Bank. OR personnel bring an EHR-generated Blood Bank Pick-up Slip to Blood Bank to retrieve products. The same process is followed if subsequent units are needed throughout the case.

7. Administration of blood products: Prior to administration, check appearance of the blood product and return any unit to Blood Bank that is discolored, foaming, bubbling, has abnormal cloudiness, presence of clots or loss of integrity of the bag. Administer autologous products first, directed donor units second, and other community donor units next, when applicable.

8. For emergency or add-on patients Type & Screen, Blood Type confirmation (if needed) and Prepare orders should be placed in EHR as soon as possible. The RN may call the Blood Bank to determine if products can be prepared in time for the operative procedure.

Blood Bank Cooler Protocol for Blood and Blood Components Distributed to the OR

1. With the exception of liver transplant cases, only one cooler will be issued for each OR. Additional units of blood may be ordered and placed in the cooler as long as cooler capacity is not exceeded.

   - *Exception:* liver transplant cases in the OR. See Table 1 Liver Case Plan (below).

2. A location card with the patient's ID label is located on the cooler – this indicates OR room destination and patient information.

3. Upon arrival to OR the circulating nurse reviews the identifier label on the outside of the cooler for the patient name, MRN, and unit/department location, and ensure name and MRN match patient in the OR. The units inside the cooler are also checked for proper name and MRN, blood type, appearance, and expiration date.

4. The cooler is the responsibility of the RN, to ensure necessary blood products are available at all times. The cooler remains closed at all times except when removing blood.

5. Do not disrupt frozen ice blocks, gel coolant packs, and spacers within coolers. Refer to the "UCSF Blood Bank Coolant Placement" diagram located on top of cooler for placement of frozen blocks, gel packs, and blood products.

6. The maximum number of RBCs and/or FFP units that can be stored in a cooler is 6 and the maximum number of whole blood units is 3 per cooler.

Blood and Blood Component Administration *(continued)*

7. Platelets are stored in a soft-sided insulator. The maximum number of platelets that can be stored in an insulator is 2.
8. Check cooler label for 'cooler expiration date/time'. Cooler maintains the specified temperature for up to 10 hours. BEFORE the cooler expiration date/time, the RN calls the Blood Bank to prepare a replacement cooler with frozen ice blocks. The new cooler is picked up from the Blood Bank, and the RN transfers contents and location card from expiring cooler to new cooler. Expired cooler is returned to Blood Bank.
9. RN is responsible for ensuring all remaining blood products and cooler are returned to Blood Bank at end of case.

Transfusion Reaction Suspected

If a suspected blood transfusion reaction occurs, immediately stop the transfusion and notify the OR surgical team members. Follow instructions in procedure section "Suspected or Actual Transfusion Reaction – Procedure."

Table 1: Liver Case Blood Product Plan

Non-Complex:

Age	RBCS XM'D	*FFP/FP24	PLT doses	*CRYO
Adult (> 10 yr)	10	10	2	20
Peds (2-10 yr)	6**	5	2	10
Infant (<2 yr)	4***	2	2 Pedi	10

Complex: Antibody/Rh Neg Patient/Special Requests from Liver Team

Age	RBCS XM'D	*FFP/FP24	PLT Doses	*CRYO
Adult (>10 yr)	20	10	2	20
Peds (1-10 yr)	15	5	2	10
Infant (<1yr)	10	3	2 Pedi	10

* Thaw when requested by OR

** For age group 2-10 yr, Blood Bank will honor requests for washed RBCs

*** RBCs for patients <2 yrs old must include 2 washed and 2 fresh (<5 days) pRBCs to prevent hyperkalemia.

Appendix C updated by: Jeanette Bird, RN, MSN, CNOR; Erika Grace, RN, MS, CNOR

Appendix D: Massive Transfusion Protocol Reference

Massive Transfusion Protocol
UCSF Medical Center

Indication: When blood products are needed emergently for a massively bleeding patients regardless of status of standard pretransfusion testing (ordered/in-progress/completed)

What's in a MTP?
A cooler of products 4 uncrossmatched RBCs (O neg), 4 FFP (AB) & 1 apheresis platelets

PRBCs, FFP, and platelets can be ready for pick up in 5 minutes

Procedure:

1. **CALL the Blood Bank**:

	Phone number	Location
Parnassus	415-353-1313 or x3-1313 internal	Moffitt Fifth Floor
Mission Bay	415-476-1404 or x6-1404 internal	Gateway Medical Building Second Floor, M-2348
Mt. Zion	415-885-7791 or x5-7791 internal	Second Floor, Room B-235

***Follow script*:**

1. "We need to activate the Massive Transfusion Protocol."
2. "The patient's name is_____ and medical record number is _____."
3. "The location is _____unit/OR# at Parnassus/Mission Bay/Mt. Zion site."
4. "The unit/OR contact person is:_____(name & phone # to take calls from blood bank)
5. "The ordering provider is _____ (*full name*)."
6. We will send a runner with a patient label to get the blood."

2. **Patient Labels**: Obtain a patient label to send with runner
3. **SEND runner to Blood Bank** to pick up blood with patient label
   - Instruct runner to go to front of line at Blood Bank and tell staff "I am here to pick up MTP blood products"
   - A patient label must be brought to the Blood Bank for all subsequent pick-ups
   - If more blood is needed, Contact Person should CALL blood bank (ask to speak to Lead Tech) and order additional MTP cycles/packs (4+4+1) or ask for specific type/number of products
4. If possible draw a blood sample for a Type and Screen BEFORE blood products are infused
5. **APeX orders** for Massive Transfusion Protocol should be entered by provider, as soon as patient is stable. Orders must be entered within 24 hours after event. This is an FDA requirement.
6. **RETURN** unused blood products to the Blood Bank ASAP

Appendix E: Emergency Release Protocol Reference

Emergency Release Protocol
UCSF Medical Center

Indication: Emergency Release should be activated by a physician only if the risks of delay in transfusion outweigh risks of transfusing *uncrossmatched* RBC units prior to completion of standard pre-transfusion testing

What's included in an Emergency Release?

PRBCs (uncrossmatched group O) can be ready for pick up in 5 minutes

Although other individual products (FFP, cryoprecipitate or platelets) can also be ordered using this protocol, the Massive Transfusion Protocol should be activated if a patient requires all products (RBCs, FFP and platelets) emergently

1. Procedure: CALL the Blood Bank

	Phone number	Location
Parnassus	415-353-1313 or x3-1313 internal	Moffitt Fifth Floor
Mission Bay	415-476-1404 or x6-1404 internal	Gateway Medical Building Second Floor, M-2348
Mt. Zion	415-885-7791 or x5-7791 internal	Second Floor, Room B-235

***Follow script*:**

1. "We need to activate Emergency Release Protocol."
2. "The patient's name is_____ and medical record number is _____."
3. "The location is _____unit/OR# at Parnassus/Mission Bay/Mt. Zion."
4. *"We need……(**specify the product type(s)** & number of units needed)*
5. "The Contact Person on the unit is:…….(name & phone # to take calls from blood bank)
6. "The ordering provider is _____ (*full name*)."
7. "We will send a runner with a patient label to get the blood."

2. Patient Label: Obtain a patient label to send with runner

3. SEND runner to Blood Bank to pick up blood (patient label is required)

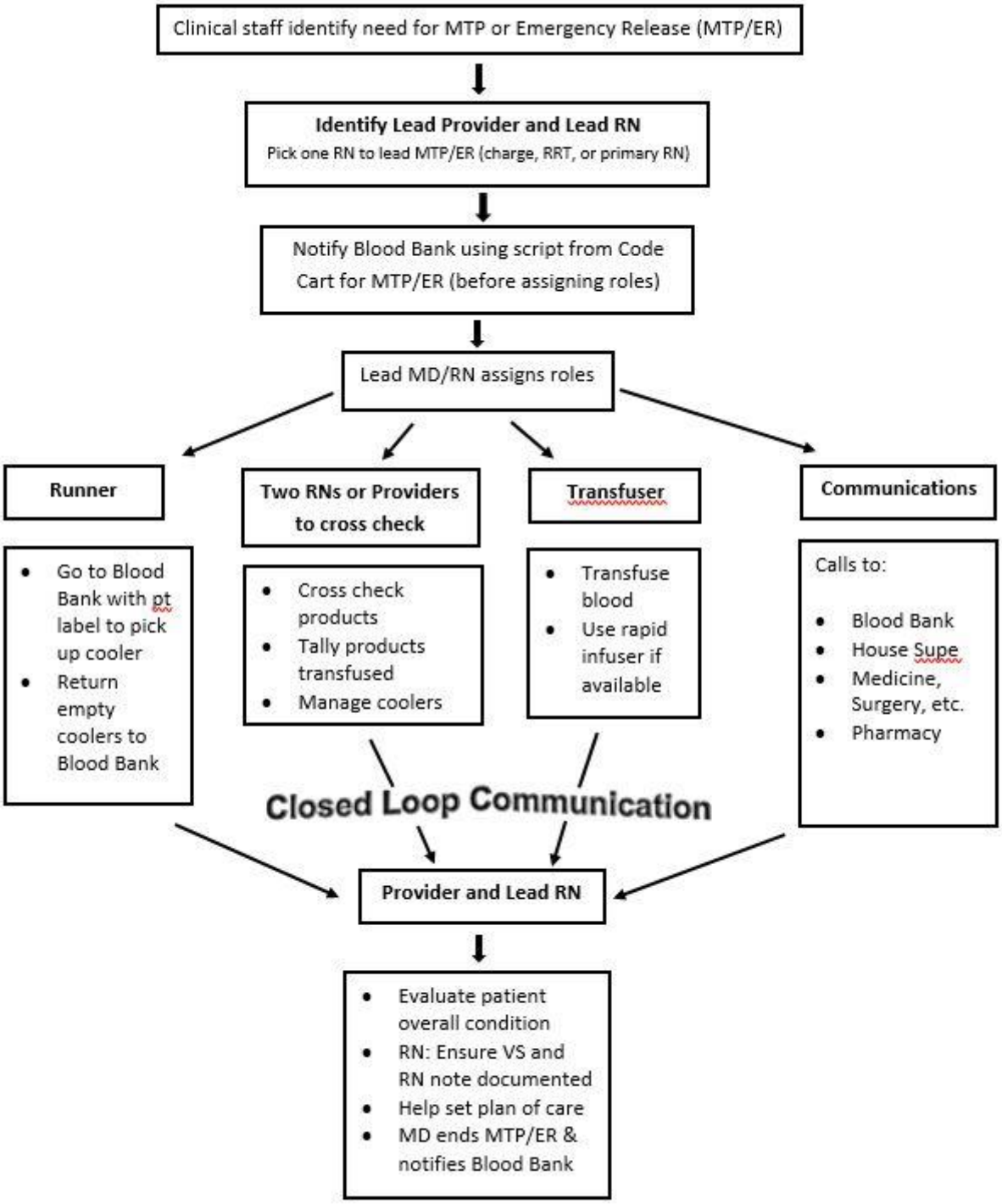
- Instruct runner to go to front of line at Blood Bank and tell staff "I am here to pick up Emergency Release blood products"
- A patient label must be brought to the Blood Bank for all subsequent pick-ups
- If more blood is needed, Contact Person should CALL blood bank (ask to speak to Lead Tech) and use above script

4. If possible, draw a blood sample for a Type and Screen BEFORE blood products are infused.

5. APeX orders for Emergency Release should be entered by provider, as soon as patient is stable. Orders must be entered within 24 hours after event. This is an FDA requirement.

6. RETURN unused blood products to the Blood Bank ASAP

Appendix F: Roles during Massive Transfusion Protocol or Emergency Release



Blood and Blood Component Administration *(continued)*

REMINDER FOR TWO RN/PROVIDER DOUBLE CHECK

- Always check blood at patient bedside with armband and two unique identifiers

INSTRUCTIONS FOR PROVIDERS

- Activating MTP/Emergency Release (MTP/ER):
  - Upon identification of need, clinical staff will immediately notify provider and team (if not done already)
  - Lead Provider: Team(s) select one provider to serve as Lead provider
  - Lead RN: Clinical staff will select most appropriate staff to assume role of Lead RN
  - (charge RN, RRT RN, Primary RN, or other designee)
- Once activated:
  - Do **not** enter EHR orders for any product during the event
  - **Communicate all requests verbally** to the Blood Bank (for additional standard MTP packs or specific individual products) in order to avoid duplication of work and delays in product set up
- Provider enters EHR order within 24 hours following event
- Order “Type & Screen” STAT for baseline or delegate verbal order to RN
- Cryoprecipitate is not included in the standard MTP pack; notify Blood Bank if required
  (Blood Bank requires at least 30 min to thaw, label, and issue cryoprecipitate)
- Request hemostatic products from Pharmacy
  (e.g., prothrombin complex concentrate and recombinant F VIIa)

ROLE OF BLOOD BANK

- On MTP activation, Blood Bank immediately prepares uncrossmatched
  O negative pRBCs x 4 units, FFP x 4 units, plts x 1 unit (see above)
- Issue first MTP/ER cooler to runner
- Immediately prepare next MTP/ER cooler when the first is picked up;
  Repeat until notification is received that MTP/ER is complete
- Prioritize testing and blood issue for MTP/ER
- Assess blood inventory and order additional stock as necessary
- Assess staff levels and call in back-up personnel as necessary
- Promptly communicate anticipated delays or complications to the clinical team

Appendix G: Blood Component Administration for Transport

Transfusing Blood Components from a Referring Hospital: (While in transport to UCSF)

1. Obtain a copy of the Blood Bank record/transfusion record from the referring hospital.
2. Verify patient's name and hospital number on ID band with name and hospital number on blood bag and co-sign above with another RN/MD.
3. Verify patient's blood type, compatibility, blood component, volume to be infused, any special considerations, and expiration date, and co-sign above with another RN/MD per UCSF blood product administration policy.
4. Document on flow sheet: donor number, type and volume of blood product administered; and vital signs at start of and 15 minutes after transfusion begins and 15 minutes after transfusion is complete.
5. Once the patient has reached UCSF, return all unused blood products and all accompanying blood product documentation from the outside institution to the UCSF Blood Bank.

Transfusion of Blood Components from UCSF Blood Bank during Transport: (Outside UCSF)

1. Provider orders blood products from Blood Bank per UCSF protocol, allowing one hour for processing from time specimen is received.
2. Request Blood Bank to provide a cooler for transport. Blood products are stable and may be used for the duration noted on the coolers. Return any unused blood products with the cooler to Blood Bank upon return from transport.
3. Make a copy of the UCSF blood bank/transfusion record for the referring hospital and return the original to the patient's medical record at UCSF upon return.
4. Follow UCSF protocols above for verification and documentation.

Transfusion of Blood Components within UCSF

1. All blood products must be returned to Blood Bank if not actively infusing when moving a patient from one unit to another (e.g., Emergency Department to acute care unit). The receiving unit of the patient must request any needed blood products via new Extra pick-up slips.

Appendix H: Blood Administration Reference

COMPONENT	INDICATIONS	TYPICAL VOLUMES	TUBING/FILTER	SPECIAL CONSIDERATIONS	INFUSION RATE
PACKED RED BLOOD CELLS (PRBCs, RBCs)	Severe anemia (Hb ≤ 7 gm/dL) Used to increase the red cell mass without delivering plasma component	250-300 mL 75 mL ~ each divided (Pedi) Pediatric weight-based: 10-15 mL/kg	**Bag:** SmartSite Blood Infusion Set, 180 micron filter (PMM 62429) for Alaris pump administration Or **Syringe:** 1. Pre-filtered from Blood Bank. Attach to Extension set tubing (e.g., PMM 180998) for Medfusion syringe pump administration; 2. Neonatal Blood Administration Set with 150 micron filter and 30 mL syringe. Or **Gravity:** Y-type Blood Solution Set, 170-260 micron filter (PMM 5926 or 20336) for gravity administration (e.g., emergent or massive transfusion protocol)		**Adults & Peds** *First 15 min:* • 60-120 mL/hr. *After 15 min:* • Administer over 1-2 hours (180-240 ml/hr) for hemodynamically stable patients • Transfuse at faster rates (or to gravity) as ordered; discuss plan with provider • Do not exceed 4 hours from spiking blood **Patients at risk of fluid overload:** • 1 mL/kg/hr. **Neonates & infants** (<10 kg) • 2-5 ml/kg/hr.

Blood and Blood Component Administration *(continued)*

COMPONENT	INDICATIONS	TYPICAL VOLUMES	TUBING/FILTER	SPECIAL CONSIDERATIONS	INFUSION RATE
PLATELETS, INCLUDING PSORALEN-TREATED PLATELETS	Active bleeding in thrombocytopenic patients Prophylactic to prevent bleeding due to severe thrombocytopenia	Platelet pheresis ~300-400 mL Pedi platelet pheresis ~ 150 mL Quad platelet pheresis ~ 75 mL Pediatric weight-based: 10-15 mL/kg	**Bag:** SmartSite Blood Infusion Set, 180 micron filter (PMM 62429) for Alaris pump administration Or **Syringe:** Pre-filtered from Blood Bank. Attach to Extension set tubing (e.g., PMM 180998) for Medfusion syringe pump administration Or **Gravity:** Y-type Blood Solution Set, 170-260 micron filter (PMM 5926 or 20336) for gravity administration	Do NOT refrigerate or put in cooler Order amount needed if < 50 mL Psoralen-treated platelets do not require testing for CMV nor do they need to be irradiated	***Adults & Peds*** *First 15 min:* • 120-300 mL/hr. *After 15 min:* • 300 mL/hr. or as tolerated (generally given over 30 min - 1 hour) **Patients at risk of fluid overload:** • 1mL/kg/hr. (or volume-reduced) **Neonates & infants (e.g., < 10 kg)** • 4-10 mL/kg/hr. or as tolerated

Blood and Blood Component Administration *(continued)*

COMPONENT	INDICATIONS	TYPICAL VOLUMES	TUBING/FILTER	SPECIAL CONSIDERATIONS	INFUSION RATE
GRANULOCYTES	Used in conjunction with antibiotics in certain types of infections in neutropenic patients	200-300 mLs	**Bag:** SmartSite Blood Infusion Set, 180 micron filter (PMM 62429) for Alaris pump administration	Do not transfuse granulocytes within 4 hours of an amphotericin B infusion Infuse granulocytes as soon as they are available Syringe pump may be used in ICN and pediatric populations	**Adults:** 1-2 mL/min during first 15 minutes, then 120-150 mL/hour or as tolerated **Peds/neonates:** Do not give rapidly. May be infused as slow as 1 mL/kg/hr. as long as it is completed in <4 hours Usually transfused over ~2-4 hours
CRYOPRECIPITATE	For treatment of patients with Factor XIII deficiency, DIC, or severe liver disease with low fibrinogen levels	~15mL/single unit ~75 mL/pool of 5 Pediatric weight-based: 1-2 units (~15-30 mL/10 kg)	**Bag:** SmartSite Blood Infusion Set, 180 micron filter (PMM 62429) for Alaris pump administration Or **Gravity:** Y-type Blood Solution Set, 170-260 micron filter (PMM 5926 or 20336) for gravity administration		As rapidly as tolerated

Blood and Blood Component Administration *(continued)*

COMPONENT	INDICATIONS	TYPICAL VOLUMES	TUBING/FILTER	SPECIAL CONSIDERATIONS	INFUSION RATE
FRESH FROZEN PLASMA/ Plasma	Used in massive hemorrhage, and multiple clotting deficiencies to replace clotting factors	200-300 mLs (adult) 75 mLs (peds) Pediatric weight-based: 10-15 mL/kg	**Bag:** SmartSite Blood Infusion Set, 180 micron filter (PMM 62429) for Alaris pump administration Or **Gravity:** Y-type Blood Solution Set, 170-260 micron filter (PMM 5926 or 20336) for gravity administration	Caution: Do not administer via IV push or rapidly for volume replacement in the pediatric cardiac patient population due to risk of hypocalcemia	**Adults:** 2-5 mL/min during first 15 minutes, then as rapidly as tolerated, ~ 300 mL/hr. **Peds/neonates:** 4-10 mL/kg/hr. or as tolerated **Adults/Peds:** If fluid overload risk, may transfuse as slow as 1mL/kg/hr.
ALBUMIN	Colloid volume expander (short duration only)	5% Albumin 250 mL and 500 mL bottles	***Filter not necessary*** **Bottle:** Gravity administration: Vented IV tubing Alaris pump administration: Alaris pump	Obtain from pharmacy/Pyxis May be placed on infusion pump if large volume required Syringe pump may be used in ICN and pediatric populations	As ordered based on indication and patient condition or wide open
	Replacement post-paracentesis in some population	25% Albumin 50 mL and 100 mL vials			

Blood and Blood Component Administration *(continued)*

COMPONENT	INDICATIONS	TYPICAL VOLUMES	TUBING/FILTER	SPECIAL CONSIDERATIONS	INFUSION RATE
	*Adult population reference: UCSF Adult Albumin Consensus Guidelines (June 2018)		Infusion set (PMM 62478) Or **Syringe:** Use vented spike (PMM 30793) and extension set tubing (e.g., PMM 180998) for Medfusion syringe pump administration		

Appendix H updated: 10/2018 by UCSF Blood Bank, Lisa Tsang RN MSN CNS and Benjamin Tanner, RN MSN CNS

3/2020 by Benjamin Tanner, RN, MSN, CNS; Ashok Nambiar, MD (Granulocytes)

9/2020 by Benjamin Tanner, RN, MSN, CNS; Lisa Tsang, RN, MN, CNS; Ashok Nambiar, MD (weight-based volumes)

Blood and Blood Component Administration *(continued)*

Appendix I: Pre-Surgical Type & Screen Lab Collection Procedure

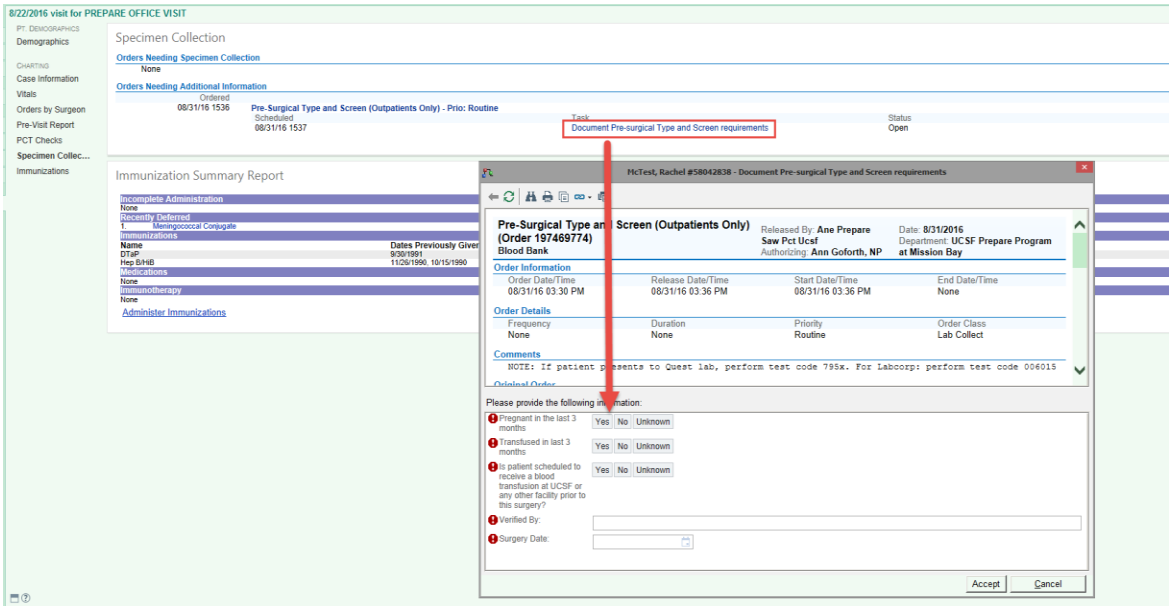
- **The "Pre-surgical Type & Screen" lab specimen is drawn in an outpatient department for patients with a planned surgical procedure within the subsequent 28 days. The lab result is valid for 28 days when the answer is NO to the 3 questions below.**

The "Pre-surgical Type & Screen" requires that the patient answers 3 questions prior to drawing the lab sample and that responses are documented in EHR.

1. Has patient been pregnant in the last 3 months?
2. Has patient been transfused in the last 3 months?
3. Is patient scheduled to receive blood transfusion at UCSF or other facility *prior* to the planned surgical procedure?

Documentation of responses to the 3 questions is documented in EHR following the procedure below.

1. The pre-surgical Type & Screen order triggers a "Task" to appear in the order.
2. In the "Specimen Collection" area and under "Orders Needing Additional Information", the "Task" hyperlink appears to document the requirements (answers to the 3 questions).
3. Click the hyperlink, "Document Pre-surgical Type & Screen requirements."
    a. Document patient's responses.
    b. Enter your name in the "Verified By" field.
    c. Enter the planned "Surgery Date."
    d. Select "Accept" and the order will be sent electronically to Blood Bank with all the relevant information so it is available to collect/accept the sample using Collection Manager (CLM). *There is no need to write the above information on the paper requisition.*



Appendix I originated 9/2016 by UCSF Blood Bank