

**BLOOD COMPONENT THERAPY
2012**

Terry Gernsheimer, MD

Meghan Delaney, DO, MPH

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Puget Sound Blood Center (PSBC)

921 Terry Avenue
Seattle, WA 98104-1256

Puget Sound Blood Center (PSBC)
Transfusion Service Laboratories:

Central Transfusion Laboratory (206) 292-6525
University District Laboratory (206) 522-2462
Seattle Childrens Hospital Transfusion Service (206) 987-5151
East Side Laboratory (425) 453-4560
South Center Laboratory (425) 656-7900

On-Call Physician for Consultation:

Call (206) 292-6525 or any of the above laboratories



Puget Sound Blood Center
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TRANSFUSION CONSULTATIONS

The Puget Sound Blood Center (PSBC) Transfusion Services Laboratories operate 24 hours a day. Questions about samples, procedures, blood component orders or delivery should be directed to the University District Laboratory (serving UWMC, Northwest Hospital, and Swedish Ballard), the Seattle Childrens Hospital Transfusion Service, the Eastside Laboratory serving Overlake and Group Health Hospitals, or the Central Transfusion Laboratory (serving other hospitals).

A PSBC physician is on call at all times to resolve problems or provide medical consultation with regard to all aspects of transfusion. The on-call physician may be paged by calling (206) 292-6525 or by contacting any of the Transfusion Service Laboratories (telephone numbers on back cover).

RED BLOOD CELLS

Description

One unit of red blood cells (RBC) contains ~200mL RBCs, 100 mL AS-5 (Optisol[®], a nutrient solution added to extend shelf life to 42 days) and ~30mL plasma. RBC must be stored between 1-6° C.

All RBC transfusions must be ABO/Rh compatible with the recipient. In dire emergencies, type O Rh-negative can be used for all patients but are usually reserved for females of childbearing potential while O/Rh+ can be used for males or females > 50y. RBC units do not provide viable platelets or significant amounts of coagulation factors.

Indications

RBC transfusion is indicated for patients with symptomatic anemia that cannot be corrected with iron, vitamin B12, folic acid or erythropoietin within a reasonable amount of time to relieve symptoms.

Therapeutic Effect

In a 70 kilogram adult, each RBC unit should increase the hematocrit by 3-4%.

EMERGENCY RED BLOOD CELL USAGE

Many hospitals in Puget Sound have a limited supply of uncrossmatched type O Rh-negative RBCs for bleeding patients in dire emergencies.

Type O, Rh-negative RBCs can be transfused to women who are beyond childbearing age and to males over the age of 16 years with any blood type with only a small risk of hemolysis. The risk of hemolysis increases in patients who have previously been transfused or pregnant and may have formed antibodies to RBC antigens.

When Rh-positive RBCs are used in Rh-negative patients, there is a chance of D immunization, and therefore should be used only in life-threatening emergencies. When uncrossmatched type O, Rh-positive RBCs are considered, the following algorithm should be used:

For **all patients < 16 years old**, use type O, Rh-negative RBCs.

For **females < 50 years old**, use type O, Rh-negative RBCs.

For **males > 16 and women beyond childbearing**, use type O, Rh-positive RBCs.

If the supply of Rh-negative RBCs has been exhausted, Rh-positive RBCs may be used in life-threatening emergencies if the patient is not known to have antibodies to Rh antigens.

If Rh-positive blood is given to a Rh-negative woman of child-bearing age, contact a PSBC physician for management.

If crossmatched blood is not available, type O RBCs of the appropriate Rh type being held for another patient may be used in a life-threatening emergency. PSBC must be informed immediately that this has occurred so that these units can be replaced. A provider-signed justification is needed for all use of uncross-matched blood.

Contact the PSBC Physician on Call if any questions.

SPECIAL CONSIDERATIONS IN PEDIATRIC RBC TRANSFUSIONS

Longer storage of RBCs can increase extracellular potassium that may cause cardiac toxicity. Adenine & mannitol in RBC additive solutions may cause liver and renal toxicity if given in large doses. For these reasons, the choice of RBC products is based on dose.

Definitions

Routine/small volume transfusion: Typically 10 mL/kg (Indications: Routine transfusion, anemic NICU patient from blood draws.)

Large volume transfusion: 20-25 mL/kg (Indications: intra-uterine transfusion, cardiac surgery with bypass, Extracorporeal Membrane Oxygenation [ECMO]/ Extracorporeal Life Support [ECLS], trauma)

Infant blood protocol: To prevent excess phlebotomy, a single sample from baby <4m may be used for crossmatching until baby is 4m.

Pediatric-Specific RBC Products

Pedi-pack: 1 adult-sized RBC unit containing CPD preservative divided into 4 pedi-packs

Each pedi-pack unit could potentially be given to a different patient

Volume: ~70mL (1/4 of an adult-sized RBC unit plus preservative)

CPD: Contains anticoagulant citrate, phosphate, dextrose without mannitol or adenine

Shelf-life: <7 days “fresh”, expires on day 8

Attributes: Leukoreduced, HbS-free, irradiated (if child <4m or if indicated otherwise)

HCT of unit: 65%

Indications: Used for small or large volume transfusions

Dose: 10 – 15 mL/Kg will increase Hb ~2-3g/dL or Hct 7-9%

Assigned aliquots: 1 adult-sized RBC unit containing AS-5 preservative divided into 8 aliquots

To reduce donor exposure, all aliquots are used for one child only

Volume: ~40mL (1/8 of an adult-sized RBC unit plus preservative)

AS-5 (Optisol): Similar to CPD plus mannitol & adenine

Shelf-life: 42 days

Attributes: Leukoreduced, HbS-free, irradiated (if child <4m or if indicated otherwise)

HCT of unit: 57%

Indications: Used for small volume transfusions.

Dose: 10-15mL/kg will increase Hb ~1.6 g/dL

Reconstituted Whole Blood: Used for manual RBC exchange transfusions.

AS-5 RBCs mixed with type AB fresh frozen plasma (FFP)

Leukocyte reduced, HbS-free, irradiated

Platelets not present in this product; post-procedure platelet count should be obtained.

PLATELETS

Description

Platelets are essential for the initial phase of hemostasis. All platelet units contain plasma, a small numbers of RBCs, and leukocytes. Platelet units must be maintained at room temperature and agitated during storage.

PSBC provides platelets **in two different formats**, a pooled product from multiple donors and an apheresis unit from a single donor.

Pooled platelet units are prepared from platelets that have been harvested after centrifuging whole blood (WB) units from separate, random donors. Although up to 8 units of WB platelets can be pooled for transfusion, the usual adult dose is a pool of 4-6 units of WB platelets; this contains ~240-360 mL of plasma. Platelets expire 4 hours after pooling. Each pooled unit contains platelets with the same ABO type, but if ABO compatible platelets are unavailable, ABO incompatible platelets can be substituted with very little increased risk. Pooled platelets expire 4 hours after being pooled for release from the blood center regardless of availability of incubated storage at the local hospital. One pooled platelet product is often called a “six pack” because platelets from 6 whole blood units were traditionally pooled to make the pooled product.

Apheresis platelet units are collected from a single donor and are equivalent to a pooled platelet unit containing ~4-6 pooled units; an apheresis platelet unit contains 200-400mL of plasma. They may be collected and given as a random unit (random apheresis platelets) or collected for a specific recipient from an HLA-compatible donor (matched apheresis platelets). Apheresis platelets expire 4 hours after processing for release from the blood center unless incubated storage is used at the local hospital.

Indications

In patients with thrombocytopenia, spontaneous bleeding does not generally occur until the platelet count is below 5,000-10,000/ μ L, but this may vary depending on the patient's clinical condition. The recommended threshold for prophylactic platelet transfusions in patients undergoing chemotherapy or hematopoietic stem cell transplantation is 10,000/ μ L. Other coexisting clinical conditions may raise this threshold.

In bleeding patients, a platelet count above 50,000 should be maintained.

In surgical patients, the threshold varies depending on the procedure. For most surgeries 30,000-50,000/ μ L is adequate. For high-risk procedures, such as neurologic or ophthalmologic surgeries, 100,000/ μ L is recommended

In patients with abnormal platelet function, spontaneous bleeding may occur at higher platelet counts. Platelet dysfunction may be congenital, or due to medications, sepsis, malignancy, tissue trauma, obstetrical complications, extracorporeal circulation, or organ failure such as liver or kidney disease. If platelet dysfunction is present, the bleeding patient or the surgical patient will require a higher platelet count to achieve hemostasis.

In patients who do not significantly increase platelet counts following random donor platelet transfusions (“refractory”), HLA-matched platelets are indicated. Refractoriness is often due to formation of “alloantibodies” to HLA antigens on platelets by the recipient. A 15-min-1 hr post count is needed to gauge response.

In patients with immune-mediated thrombocytopenia (ITP) and thrombotic thrombocytopenia purpura (TTP), platelet transfusions may not be indicated unless there is significant bleeding. In ITP, transfusion increments are usually poor and platelet survival is very short. Platelet transfusions are generally contraindicated in patients with TTP unless there is clinically significant bleeding.

In pediatric patients, the usual platelet dose is 1 unit whole blood platelet per 10 kg patient weight or 5-10 mL/kg. A 50,000/ μ L rise in platelet count is expected with each dose.

Therapeutic Effect

Expected Platelet Increment*

	1 unit 1.0 X 10 ¹¹	4 units 4.0 X 10 ¹¹	6 units 6.0 X 10 ¹¹
50 lb/23 kg	22,000/uL	88,000/uL	132,000/uL
100 lb/45 kg	11,000	45,000	66,000
150 lb/68 kg	7,400	30,000	44,000
200 lb/91 kg	5,500	22,000	33,000

*In a patient with a normal sized spleen and without platelet antibodies. The survival of transfused platelets averages 3 to 5 days but will decrease if a platelet-consuming process is present. Correction of a prolonged bleeding time in

platelet dysfunction will depend on whether a condition exists that will also affect transfused platelets (e.g., antiplatelet agents, uremia).

FRESH FROZEN PLASMA (FFP) AND THAWED PLASMA

Description

Plasma is the liquid component of blood and is free of RBCs, leukocytes and platelets. One unit of plasma is the plasma taken from one unit of whole blood and is ~250mL.

FFP is frozen within eight hours of whole blood collection and contains all coagulation factors in normal concentrations. After FFP is thawed ("thawed plasma"), it may be transfused up to 5 days later, but contains slightly decreased levels of Factor V ($66 \pm 9\%$) and decreased Factor VIII levels ($41 \pm 8\%$).

Although plasma must be ABO-compatible, Rh factor need not be considered. Since there are no viable leukocytes, plasma does not carry a risk of CMV transmission or Graft vs. Host Disease (GVHD).

Indications for Plasma Transfusion

In patients with documented coagulation factor deficiencies and active bleeding, or about to undergo an invasive procedure. Usually, there is an increase of at least 1.5 times the normal PT or PTT, or an INR ≥ 1.6 before clinically important factor deficiency exists. This corresponds to factor levels $<30\%$ of normal. Deficiencies may be congenital or acquired secondary to liver disease, warfarin anticoagulation, disseminated intravascular coagulation, or massive replacement with RBCs and crystalloid or colloid solutions. FFP should not be used for Hemophilia B (Factor IX) deficiency unless Factor IX concentrate is not available. FFP, but not thawed plasma, can be used for Factor V deficiency. Recombinant or Factor VIII concentrates should be used to replace Factor VIII.

In patients taking warfarin with significant bleeding or risk of bleeding, plasma may be used to reverse anticoagulation. Often it will require recurrent transfusion to maintain normal factor levels. Otherwise, reversal can be achieved by giving Vitamin K or holding warfarin two to three days prior to a planned procedure. Rapid reversal for life threatening bleeding may be achieved with recombinant Factor VIIa (Novo7[®]).

In persons with TTP, plasma should be given in conjunction with plasma exchange.

Plasma should not be used for volume expansion unless the patient also has a significant coagulopathy and is bleeding.

Pediatric patients dosing is 10-15mL/kg, to provide ~15-20% rise in factor levels.

FFP Dosing

1 FFP unit (200-250 mL) contains roughly 220U coagulation factors
A dose of 10 mL/kg of body weight increases factor levels by 10-15%

To raise coagulation factors by 10%:

$(\text{Body Weight (in kg)} * 10 \text{ mL/kg}) / (200 \text{ mL/plasma unit}) = \text{No. of FFP units}$

Example:

To raise coagulation factors by 10% in a 70 kg Patient:

$(70 \text{ kg} * 10 \text{ mL/kg}) / (200 \text{ mL/plasma unit}) = 700/200 = 3.5 \text{ FFP units}$

Round up to next whole number or 4 FFP units

Therapeutic Effect

Usually a 10% increase in factor levels is needed for any significant improvement in coagulation status. The usual dose is four units, but the amount will vary depending on the patient's size, actual clotting factor levels, and procedures that

a patient will undergo. Consultation is advised concerning the dose of plasma.

Recommended Coagulation Parameters for Common Procedures

	Plt Count*	INR
Lumbar Puncture	≥ 50,000	≤1.5
Paracentesis	≥ 30,000	≤2.0
Thoracentesis	≥ 50,000	≤1.5
Transbronchial Lung Biopsy	≥ 50,000	≤1.5
Subclavian/IJ Line	≥ 30,000	≤1.5
Renal Biopsy	≥ 50,000	≤1.5
Liver Biopsy	≥ 50,000	≤1.5
Hickmann or Groshong Catheters	≥ 50,000	≤1.5

*Assuming normal platelet function.

Conditions that decrease platelet function include renal failure, medications, leukemias, myelodysplasias, and congenital disorders. Bleeding Time poorly predicts surgical bleeding. The usefulness of Platelet Function Analysis (PFA) in predicting surgical bleeding is unknown.

CRYOPRECIPITATE (CRYO)

Description

Cryoprecipitate is prepared from plasma and contains fibrinogen, von Willebrand factor, factor VIII, factor XIII and fibronectin. Cryoprecipitate is available in pre-pooled concentrates of six units or singly. Each unit from a separate donor is suspended in 15 mL plasma prior to pooling. For use in small children, up to 4 single units can be ordered. Each unit provides about 350 mg of fibrinogen.

Indications for Cryoprecipitate

Cryoprecipitate is indicated for bleeding or immediately prior to an invasive procedure in patients with significant hypofibrinogenemia (<100 mg/dL). Cryoprecipitate should not be used for patients with von Willebrand disease or Hemophilia A (Factor VIII deficiency) unless they do not (or are not known to) respond to DDAVP and recombinant and/or virally inactivated preparations are not available. It is not usually given for Factor XIII deficiency, as there are virus-inactivated concentrates of this protein available. Cryoprecipitate is sometimes useful if platelet dysfunction associated with renal failure does not respond to dialysis or DDAVP.

Cryoprecipitate Dosage

1 bag contains ~350 mg Fibrinogen

6 bags (1 pool) contains 2100 mg Fibrinogen

Recovery with transfusion = 75%

6 bag pool cryoprecipitate provides 1560 mg Fibrinogen

70 kg X .05 = plasma volume of 35 dL (3.5 L)

1560 mg = 45 mg/dL provided by 6 bag pool of cryoprecipitate
35 dL

Example:

In a 70 kg Patient:

6 bags (1 pool) of cryo raises Fibrinogen 45 mg/dL

Therapeutic Effect

Fibrinogen replacement effect is monitored by fibrinogen level assay and clinical response.

Pediatric dosing is 1 cryo unit/10kg and should increase fibrinogen by 60 - 100 mg/dL.

To replace factor VIII or von Willebrand factor: When specific factor concentrates are unavailable, the usual adult dose is a pool of 6–12 bags. Approximately 150 units of factor VIII and von Willebrand factor are provided per bag. A single donor may be used repeatedly for a young or mildly affected patient to limit donor exposures.

Fibrin glue: Although single units of cryoprecipitate are available for use in the preparation of fibrin glue to be applied locally for surgery, commercially available, virally inactivated concentrates have a higher fibrinogen concentration (Tisseel®) and are preferred for this purpose.

TRANSFUSION RELATED RISKS

Infectious Risk/Unit

Although confirmed data are not available because the rates are so low, the current estimated risk of transfusion-associated transmissions (TAT) per transfused unit are:

HIV	1: 1,500,000
Hepatitis C	1: 1,100,000
Hepatitis B	1: 280,000
HTLV I & II	1: 641,000

West Nile Virus (WNV) can be transmitted by blood transfusions but the risk is extremely low due to PCR testing performed to detect WNV. At the current time, only a single case in 2010 has been reported in Washington State.

Rarely, the infectious agents for Chagas disease (*Trypanosoma cruzi*), babesiosis, and malaria (*Plasmodium*) have been transmitted through transfusion. All blood is tested for HIV, HCV, HBV, Syphilis, HTLV-1, 2, Chagas and WNV.

CMV-seronegative, immunosuppressed persons with transplants, HIV positive patients, and low birth-weight infants are at risk for CMV infection. In Puget Sound, ~50% of blood donors are CMV-seropositive. Two methods are used to reduce the risk of TAT CMV–leukocyte reduction (LR) and provision of blood products from CMV-seronegative donors (see Blood Component Modifications). Both methods reduce this risk by more than 90% and are a generally considered equivalent methods of risk reduction. In some organ transplant recipients, CMV-seronegative or LR blood is transfused to prevent infection with second CMV strain. Breakthrough is possible with both methods.

Bacterial contamination was previously estimated to occur in 1 in 3,000 cellular blood components. Bacterial testing of platelet concentrates has significantly decreased this risk from platelet transfusions to 1 in 10,000 WBP, ~ 30 in 10,000 AP.

Transfusion Reactions

A transfusion should be stopped immediately whenever a transfusion reaction is suspected.

Hemolytic transfusion reactions occur following transfusion of an incompatible blood component. Most are due to naturally occurring antibodies in the ABO antigen system. An acute hemolytic transfusion reaction may cause hemoglobin induced renal failure and a consumptive coagulopathy (DIC). Signs and symptoms include fever, hypotension, nausea, vomiting, tachycardia, dyspnea, chest or back pain, flushing and severe anxiety. Hemoglobinuria may be noted and, in the anesthetized patient, may be the first sign of hemolysis. The diagnosis can be quickly made by centrifuging a tube of blood and examining the plasma for a reddish discoloration. A fresh sample of blood should be sent to the Blood Center for testing and all paper work and the patient's identification checked. Treatment involves fluids, diuresis and transfusion support for bleeding. A fatal hemo-

lytic transfusion reaction occurs about once in 600,000 transfusions. Most are due to clerical error or patient misidentification at the bedside.

Delayed hemolytic transfusion reactions usually occur in patients who have been previously sensitized to an antigen through transfusion or pregnancy. They can result in symptomatic or asymptomatic hemolysis several days after a subsequent transfusion due to an anamnestic recall of the antibody.

Transfusion of Rh-positive RBCs to an Rh-negative woman of childbearing age can result in sensitization and hemolytic disease of the newborn in future pregnancies. Other RBC incompatibilities (e.g., Kell) can cause hemolytic disease of the fetus and newborn.

Febrile transfusion reactions usually occur due to sensitization to antigens on cell components, particularly leukocytes. Leukocyte depletion of RBCs by filtration may be helpful in patients for whom this is a problem. LR single-donor apheresis platelets are an alternative to leukocyte depletion by filtration of pooled random donor platelets and are comparable in cost. Occasionally, removal of most of the plasma (volume reduction) is necessary to remove cytokines in platelet preparations for patient with persistent febrile reactions.

Bacterial contamination of blood products are a rare occurrence although slightly more common with platelets. Generally these reactions are quite severe with high fever, rigors and/or other systemic symptoms such as hypotension, nausea or vomiting. If a bacterially contaminated component is suspected, the transfusion should be stopped and the bag sent for gram stain and culture. PSBC should be notified immediately so co-components can be quarantined. The patient should have blood cultures obtained and, if appropriate, IV antibiotic therapy begun.

Transfusion Related Acute Lung Injury (TRALI) occurs when donor plasma contains an antibody, usually against the patient's HLA or leukocyte-specific antigens. Less often, the patient may have antibodies against donor leukocytes in the component. Symptoms of dyspnea, hypotension and fever typically begin 30 minutes to 6 hours after transfusion and the chest x-ray shows diffuse non-specific infiltrates. Ventilatory support may be required for several days before resolution. Therapy is primarily supportive. PSBC should be notified so that the donor may be tested for antibodies against the patient.

Urticaria and allergic type reactions are common and usually due to allergies to specific proteins in the donor's plasma and can be avoided with future transfusions by pretreatment with antihistamines or steroids. Only if severe (e.g., anaphylaxis), are washed RBC's and platelets to remove all plasma indicated. IgA deficiency should be considered in the case of anaphylactic reactions.

Transfusion-related Immune Modulation (TRIM)

Transfusions have been known to induce immune tolerance. This was first noted more than 20 years ago when multiply transfused kidney transplant recipients had increased graft survival. In addition, some studies suggest that transfusion may increase the rate of post-operative bacterial infection. There is also evidence from animal studies that transfusion increases the risk of metastatic disease, although human data are inconclusive.

Sensitization to foreign donor HLA antigens (i.e., **alloimmunization**) can lead to poor platelet transfusion increments. Patients may respond to apheresis platelets from HLA-matched donors or family members. HLA alloimmunization decreases the likelihood of finding a compatible donor for heart or renal transplant.

Removal of donor leukocytes has been shown to decrease the immunomodulatory effects of blood transfusions but the clinical usefulness is clear only in the prevention of alloimmunization in patients undergoing chemotherapy for AML.

BLOOD COMPONENT MODIFICATION

CMV Seronegative and Leukocyte-reduced Cellular Products

TAT CMV to susceptible patients is effectively reduced by provision of cellular blood components that are either:

- Leukocyte reduced (LR)(containing $< 5 \times 10^6$ leukocytes)
- Obtained from donors who have been determined to be CMV seronegative

The degree of risk reduction using either approach is essentially equivalent and most local and national bone marrow and solid organ transplant programs accept LR blood products as equivalent to CMV-seronegative products in preventing TAT CMV. Since many patients already receive LR blood products, PSBC recommends leukocyte reduction as the standard method for preventing TAT CMV. For reasons of inventory, PSBC routinely substitutes LR components when CMV-seronegative components are ordered.

Although both approaches are effective, breakthrough infections occur. Among patients at high risk for CMV infection (e.g. hematopoietic stem cell transplant recipients), transfusion recipients should be monitored for viremia (viral antigen or DNA) so that early treatment can be provided.

Non-cellular blood components such as cryoprecipitate, fresh frozen plasma, and 24-hour plasma are cell-free and have not been implicated in CMV transmission.

Additionally, leukocyte depletion may prevent alloimmunization to platelets and should be used in patients who are expected to need platelet transfusions during multiple courses of chemotherapy and do not have pre-existing HLA antibodies.

Irradiation (gamma)

Inactivation of lymphocytes prevents transfusion induced graft versus host disease (TA-GVHD) that may result from engraftment of donor cells in an immunosuppressed patient. TA-GVHD is uniformly fatal.

Volume Reduced Platelets

Removal of excess donor plasma is indicated in patients who cannot tolerate the full volume or when ABO incompatible single donor platelets are transfused. Volume reduction may be helpful in patients with febrile transfusion reactions that persist despite leukocyte reduction. Approximately 10-20% of the platelets are lost in this process and the extra centrifugation step may cause some platelet activation and loss of function.

Washed RBCs and Platelets

Patients with severe life threatening plasma allergies uncontrolled by medications or volume reduction may require RBCs or platelets to be resuspended in saline. Washed RBCs must be transfused within 24 hours or be wasted. The recovery and function of platelets after washing are severely impaired. PSBC physician approval is required.

Recommendations for modifications of blood products

	CMV-negative ^{1,2}	Irradiation ³	Leukocyte Reduction
Bone marrow/Stem cell transplant candidate	Yes	See 4	See 5
Solid organ transplant candidate	Yes		Heart/kidney transplant
Chemotherapy only		See 6	See 7
AIDS/HIV	Yes		
Febrile reactions			Yes (see 8)
Neonate	Yes	Yes	
Hematopoietic/lympho-proliferative malignancy		Yes	

1-For patients with negative or unknown CMV serology.

2-Leukocyte depletion may be used if CMV sero-negative blood components are not available.

3-All components for stem cell transplant patients require irradiation. All directed donations from family members or HLA matched donors require gamma irradiation.

4-Gamma irradiation is required pre-transplant for patients who may receive non-myeloablative (“mini”) transplants.

5-Required to prevent alloimmunization pre-transplant only.

6-Irradiation may be indicated in severely immunosuppressive chemotherapy, such as is used to treat patients with acute leukemia, or with fludarabine or related treatments.

7-Leukocyte reduced blood is recommended for patients who will undergo multiple cycles of chemotherapy that will require platelet transfusion support.

8-If uncontrolled by leukocyte depletion, volume depletion of platelets prior to transfusion may decrease febrile reactions.

Important Phone Numbers

Puget Sound Blood Center Transfusion Service and Physician on Call for Consultation 206-292-6525

Puget Sound Blood Centers

University District Lab	206-522-2462
East Side Laboratory	425-453-5098
South Center Laboratory	425-656-7900
HLA Matched Platelet Program	425-453-5098

Hospital Blood / Transfusion Services

Evergreen Hospital Medical Center	425-899-3898
Group Health Coop Central Hosp.	206-326-3366
Harborview Medical Center	206-744-3088
Northwest Hospital	206-368-1776
Overlake Medical Center	425-688-5084
Seattle Cancer Care Alliance	206-288-1095
Seattle Childrens Hospital	206-987-5151
Swedish Medical Center	
First Hill	206-386-2212
Ballard	206-781-6360
Providence	206-320-3738
University of Washington Medical Center	206-598-6240
Valley Medical Center	425-228-3440, Ext. 5945
Veterans Affairs Medical Center	206-764-2234
Virginia Mason Medical Center	206-625-7257



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