4.6 Transfusion

Transfusion of Red Blood Cells

Red blood cell (RBC) transfusion is generally indicated in an oncology patient for:

- Hemoglobin level of <70 g/L in patients receiving chemotherapy and/or radiotherapy
- Significant preoperative anemia (hemoglobin level <80 g/L) in emergency surgical cases

The risk/benefit ratio of administering an RBC transfusion to a patient with an Hb level greater than 70 g/L needs to be considered. When determining whether to administer RBC transfusion to a patient with an Hb level of greater than 70 g/L, the following should be considered:

- Other concurrent illnesses or co-morbidities, signs and symptoms of impaired oxygen delivery such as significant fatigue and/or persistent headaches
- Clinical status, including signs and symptoms of anemia and hemodynamic stability
- Presence/absence of bleeding or hemolysis
- Presence of reticulocytosis as a signal of imminent endogenous increase in hemoglobin
- Expected time for hematological recovery from the most recent chemotherapy cycle
- Capacity for regular monitoring of the Hb level and providing transfusion (e.g., ability to obtain regular repeat CBC, distance to clinic, weekends/holidays)

Transfusion of Platelets

Chemotherapy often results in thrombocytopenia. Bleeding in the setting of thrombocytopenia is a clinical indicator for transfusion. Patients with clinically significant bleeding and platelet counts below 50 X 10^9/L may benefit from transfusion. More commonly, prophylactic transfusions are considered in the setting where the platelet count is very low and the risk of significant bleeding is felt to be high.

Prophylactic Transfusion

Prophylactic platelet transfusions at the threshold levels indicated below are recommended for pediatric oncology patients. (C17 Platelet Transfusion Guideline)

Platelet Prophylactic Transfusion Thresholds

- For clinically stable leukemia, lymphoma or non-CNS solid tumours: platelet count <10 X 10^9/L
- For children with CNS tumours:
    - No history of intracranial hemorrhage: platelet count <30 X 10^9/L
    - Past history of intracranial hemorrhage: platelet count <50 X 10^9/L
    - Receiving anti-angiogenesis therapies (i.e., bevacizumab): platelet count <50 X 10^9/L
- For children undergoing invasive procedures:
    - Lumbar puncture: platelet count <20 X 10^9/L
    - Major invasive surgery: platelet count <50 X 10^9/L
    - Neurosurgical procedure: platelet count <100 X 10^9/L
    - Patients who are clinically unstable, such as those with fever, neutropenia and septic characteristics, may benefit from a higher transfusion threshold

Platelet Dosages

Platelet products supplied by buffy coat pool (300mL), or single donor apheresis platelets (SDP) (~250mL). One buffy coat pool (from 4 donors) has same platelet content as one SDP.

Platelet Dose for Children:
5-10 mL/kg to a maximum of 300 mL of buffy coat pool platelets (adult dose) per transfusion
OR
5-10 mL/kg of SDP to a maximum of the full SDP unit

Platelet Refractory Patients

For patients who appear to have poor increase in platelet count to transfusion, providers should consider a 1-hour post-transfusion platelet count to assess response. Patients with inadequate response may be considered for HLA antibody testing and possible HLA SDP platelet transfusions in discussion with the referring specialized childhood cancer program.

Platelet ABO Compatibility

ABO identical platelets are preferred for platelet transfusion to children whenever possible. ABO plasma incompatible platelets (e.g., Group O platelets given to a Group A patient) may result in hemolysis of the patient's red cells. To the extent possible, Group O platelets should not be transfused to non-Group O pediatric recipients, particularly if the child is not bleeding or undergoing an emergency invasive procedure. In event of platelet shortage, Group O platelets may be given to non-Group patients if the unit is of low titre[1] or plasma-reduced.

Platelet Rh Compatibility

Ideally RhD negative recipients should receive RhD negative platelet components. However, this may not be possible for inventory reasons. The risk for an RhD negative recipient of developing RhD alloimmunization after the transfusion of Rh positive platelets is very small (less than 1% in oncology patients). Female recipients should receive Rh Immune Globulin if they receive Rh positive platelets. Inability to give RhD negative platelets to an RhD negative recipient should not be a reason to withhold a necessary platelet transfusion.

Rh Immune Globulin (RhIg) Dosing

The smallest vial (120 mcg or 600 IU) is sufficient regardless of recipient weight, and may be administered IV or IM. The antibody usually lasts about 3 months. A repeat dose may be given within 3 months if anti-D is no longer detectable by antibody screen and more RhD positive platelets have to be transfused.

[1] Some transfusion services perform isohemagglutinin titres on Group O platelets before transfusion to non-Group O patients. If the anti-A titre of a Group O platelet is low, the unit may be given to a Group A patient. If the anti-B titre of a Group O unit is low, the unit may be given to a Group B patient. Definitions of low titre (<1:50, <1:64, <1:100, etc.) vary by hospital.

Transfusion of Frozen Plasma (FP)

Note: Frozen Plasma (FP, frozen within 24 hours) has replaced Fresh Frozen Plasma (FFP, frozen within 8 hours) for most clinical uses.

Indications for Replacement Therapy

- Bleeding, or an invasive procedure, in a patient with a significantly prolonged PT/INR or PTT (PT/INR/PTT >1.5 x top of age-related normal value) when alternate medical therapy (e.g., vitamin K) is not feasible or effective.

Transfusion of Cryoprecipitate

Bleeding, or an invasive procedure, in patients with hypofibrinogenemia (*fibrinogen levels <1.0 g/L*). Usual dosing is 0.5-1 unit per 5kg of patient mass.

Transfusion of Albumin

- Acute correction of hypoalbuminemia *when clinically indicated*.
- Correction of hypovolemia when *colloid infusion is clinically indicated*.

Indications for Transfusion of Cytomegalovirus Antibody Negative (Anti-CMV Negative) Cellular Blood Products (Red Cells and Platelets)

All blood products in Canada are prestorage leukoreduced and considered to be at very low risk for CMV transmission (CMV is transmitted through white cells). As a result of this, the use of Anti-CMV Negative blood products now has far fewer indications in pediatric oncology.

Indications for Transfusion of Irradiated Cellular Blood Products (Red Cells and Platelets)

- Hematopoietic progenitor cell transplant (bone marrow transplant) recipients, both allogeneic and autologous transplants.
- All patients on chemotherapy (hematologic malignancies, malignant solid tumours, histiocytic disorders and aplastic anemia patients receiving immune suppression). In a setting where irradiated blood products are not immediately available, a consideration of the risk and benefits of irradiation should be discussed with the specialized childhood cancer program. In these cases, after consideration of the patient's chemotherapy regimen and the state of hematopoietic recovery, it may be appropriate to proceed with non-irradiated products.
- HLA-matched apheresis platelets.

Transfusion Reactions

- Any transfusion reaction at a POGO Satellite Clinic that results in the need for future pre-medication or blood product special preparation should be reported to the referring specialized childhood cancer program.
- Similarly, any premedication and special preparation requirements of blood products determined by the specialized childhood cancer program should be communicated to the POGO Satellite Clinic.
- Note that a single mild transfusion reaction such as urticaria does not require premedication with antihistamines or corticosteroids for all future transfusions.

References

1. Clinical Guide to Transfusion Medicine, Canadian Blood Services, 2013. https://professionaleducation.blood.ca/en/transfusion/clinical-guide-transfusion
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4. Treleaven, J., Gennery, A., Marsh, J., Norfolk, D., Page, L., Parker, A., et al. (2011, January). Guidelines on the use of irradiated blood components prepared by the British Committee for Standards in Haematology blood transfusion task force. British Journal of Haematology. https://onlinelibrary.wiley.com/doi/10.1111/j.1365-2141.2010.08444.x.

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Record of Updates

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