Pathology and Laboratory Medicine
Nova Scotia Provincial Blood Coordinating Team

Nova Scotia Guideline for Blood Component Utilization in Adults and Pediatrics

September 2020
Version 2.0
PROMOTING EXCELLENCE IN TRANSFUSION MEDICINE

http://www.cdha.nshealth.ca/nova-scotia-provincial-blood-coordinating-team
Developed by the Nova Scotia Appropriate Blood Components Working Group

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Recommended Citation:
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1. BACKGROUND

The Nova Scotia Provincial Blood Coordinating Team (NSPBCT) under the Pathology and Laboratory Medicine Program provides leadership in collaborating with healthcare providers across the province and Canadian Blood Services (CBS) to maximize the safe and appropriate management of blood and blood products for patients in Nova Scotia. The NSPBCT maintains a surveillance program for adverse events related to transfusion therapy while ensuring appropriate standards for blood-transfusion therapy are being implemented and maintained with Nova Scotia health-care facilities.

These guidelines were developed based on the advice of the Appropriate Blood Components Working Group (ABC Working Group) consisting of physicians with expertise in hematology, orthopedics, multi-organ transplant, emergency medicine, trauma, CBS, transfusion medicine, anesthesiology, surgery, critical care, general practitioners, pediatrics and obstetrics/gynecology. Appendix A provides the membership of this group.

The National Advisory Committee on Blood and Blood Products (NAC) consists of a national group of clinicians that collaborates with and provides advice on the utilization management of blood and blood products and transfusion medicine practice to the provincial and territorial (PT) Ministries of Health and Canadian Blood Services (CBS). In April 2013, NAC endorsed the guidelines set forth in the document Red Blood Cell Transfusion: A Clinical Practice Guideline from the AABB (formally known as the American Association of Blood Banks) as they were most reflective of the current practice in Canada and therefore would be most palatable to a Canadian physician. These AABB guidelines include recommendations for the pediatric setting. In 2016, the AABB published the Clinical Practice Guidelines from the AABB: Red Blood Cell Transfusion Thresholds and Storage. Revisions in the Nova Scotia Guideline for Blood Component Utilization in Adults and Pediatrics Version 2.0 are based on the AABB recommendations.

A review of published literature and an environmental scan of Canadian and international plasma and cryoprecipitate guidelines provided the recommendations in this guideline. The ABC Working Group was convened to provide expert opinion for the guideline and it was presented to stakeholders within Nova Scotia and their feedback was incorporated.

In 2014, AABB developed evidence based guidelines for the prophylactic use of platelets for adult patients who are candidates for platelet transfusion. The BC Medical Journal and the British Journal of Hematology both provide guidelines for platelet use. The ABC Working Group convened to review the evidence and developed guidelines for Nova Scotia.

2. INTRODUCTION

The Nova Scotia RBC Working Group was established in July 2013 with a goal to develop/adopt tools for the appropriate utilization of red blood cells in Nova Scotia. Based on the recommendations from NAC and Choosing Wisely Canada, that a single unit red cell transfusion should be the standard for non-bleeding, hospitalized patients; a retrospective audit was conducted. The results of the audit found 7.1% of the RBC units transfused were inappropriate. The NSPBCT supported implementation of one red cell unit at a time as per its strategic plan.

The ABC Working Group was formed in 2015 with an objective to develop guidelines that will provide standardized clinical guidance to healthcare professionals on best practice pertaining to the appropriate triggers and use of plasma, cryoprecipitate and platelet transfusions.
3. GUIDELINE DEVELOPMENT

The objective of these guidelines is to provide clinical guidance to healthcare professionals on best practice pertaining to the appropriate use of blood components and restrictive transfusion triggers for adults and children.

3.1. DEFINITIONS

**Actively bleeding:** the presence of an overt discharge of blood occurring either grossly (e.g. gastrointestinal bleeding) or internally (e.g. retroperitoneal bleeding seen on imaging).

**Acute coronary syndrome:** cardiac conditions where there is a sudden reduced flow of blood to the heart i.e. angina, myocardial infarction. (Mayo Clinic)

**Adult:** in this guideline, an adult is any person 17 years and older.

**AFFP:** (Apheresis Fresh Frozen Plasma): plasma collected by apheresis from the blood of an individual donor and frozen within 8 hours of collection.

**Apheresis:** “the process of withdrawing blood from a donor, separating specific blood components from the blood and returning the remaining blood components to the donor.”

**Blood component:** a therapeutic component of blood intended for transfusion (e.g. red cells, granulocytes, platelets, plasma, etc.) that can be prepared using the equipment and techniques (centrifugation, filtration, freezing) available at a blood center.

**Blood product:** any therapeutic product, derived from blood or plasma, and produced by a manufacturing process that pools multiple units (usually more than 12) (e.g. human serum albumin, immunoglobulin preparations and coagulation products, etc.)

**Cryoprecipitate:** a plasma component prepared from slowly thawed frozen plasma and centrifuged to separate the insoluble cryoprecipitate. The cryoprecipitate is removed and then refrozen. Cryoprecipitate is a source of fibrinogen (greater than or equal to 150 mg/unit), coagulation factors VIII, XIII and von Willebrand factor.

**Cryosupernatant Plasma (CSP):** plasma from which cryoprecipitate has been removed. Cryosupernatant Plasma (CSP) is mentioned for specific indications only.

Fibrinogen Deficiency: types of deficiency

a. **Afibrinogenemia:** complete absence of fibrinogen (less than 0.2 g/L of plasma)

b. **Hypofibrinogenemia:** lower than normal fibrinogen level (between 0.2 g/L and 1.5 g/L)

c. **Dysfibrinogenemia:** normal fibrinogen level (between 2 and 4 g/L), but the fibrinogen does not function properly.

**FP (Frozen Plasma):** plasma collected from the blood of an individual donor and frozen within 24 hours of collection.

**INR (International Normalized Ratio):** derived from prothrombin time (PT) which is calculated as a ratio of the patient’s PT to a control PT standardized for the potency of the thromboplastin reagent developed by the World Health Organization (WHO).
Life-threatening / major bleeding:
- hemorrhage resulting in airway compromise
- hemorrhage with a drop in Hgb of greater than or equal to 20 g/L or requiring transfusion of 2 units of RBC
- major trauma
- critical site bleeding (e.g. intracranial, retroperitoneal, intra-spinal, intra-ocular, intra-articular or pericardial, ruptured abdominal aortic aneurysm, acute dissection, intramuscular with compartment syndrome), or
- actual or impending hemodynamic compromise (e.g. massive or unstable gastrointestinal bleed not responding to initial resuscitation).

Minor Surgery/Invasive Procedure: major body cavities are not opened — surgery to superficial structures of the body or manipulative procedure. Minor surgery can involve the use of local, regional or general anesthesia.

Major Surgery/Invasive Procedure: involves opening a major body cavity, abdomen (laparotomy), chest (thoracotomy) or skull (craniotomy) and can stress vital organs.

One Unit at a Time Policy: hospital policies require a clinical reassessment followed by a repeat hemoglobin measurement, if required, for all hemodynamically stable patients before they may be transfused with a second or subsequent red blood cell unit. There are exemptions from this policy.

Pre-existing cardiovascular disease: having a prior history of cardiac disease i.e. myocardial infarction, coronary artery disease, arrhythmia, congestive heart failure, congenital heart defects. (Mayo Clinic)

Restrictive Transfusion Trigger: the hemoglobin value at which physicians in Nova Scotia may consider transfusion for stable hospitalized inpatients. The Nova Scotia Red Blood Cell Clinical Expert Working Group has set this level at 70 g/L. Not all patients will require transfusion at this level. Well compensated patients tolerate much lower hemoglobin levels while patients with symptoms of anemia may require a transfusion when hemoglobin is above this threshold.

S/D Plasma (Solvent Detergent-treated Plasma): plasma treated with solvent detergent reagents producing a virus inactivated product. The S/D process inactivates enveloped viruses (HIV, HBV and HCV) but has no effect on the non-enveloped viruses (HAV, parvovirus B19). S/D Plasma is mentioned for specific indications only.

4. GUIDELINES

4.1. RED BLOOD CELLS (RBCS)

Hemoglobin levels must be obtained within 24 hours of the request with the exception of outpatients which must be obtained within 96 hours of the request.

The following patient conditions are exempt from the RBC guideline:
- Actively bleeding, massively bleeding and suspected bleeding
- Acute coronary syndrome
- Pediatric patients less than four months (corrected age)
- Intrauterine transfusions
- Chronically transfused
The following indications and dosing recommendations are illustrated on the RBC Transfusion Pathway in Appendix B.

**Adult Indications and Dosing**

<table>
<thead>
<tr>
<th>Hemoglobin Level and Indications</th>
<th>Recommendation and Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than or equal to 70 g/L</td>
<td>Transfuse 1 unit and re-check patient symptoms and hemoglobin prior to transfusing a 2nd unit</td>
</tr>
<tr>
<td>Outpatient or a patient undergoing dialysis and hemoglobin less than or equal to 70 g/L</td>
<td>Transfuse as requested</td>
</tr>
</tbody>
</table>
| Less than or equal to 80 g/L with one or more of the following:  
  - Pre-existing cardiovascular disease  
  - Hematology/Oncology patient with chemotherapy-induced cytopenia  
  - Undergoing orthopedic surgery or cardiac surgery | Transfuse as requested |
| Patient is undergoing radiation therapy and hemoglobin less than or equal to 100 g/L | Transfuse as requested |
| Obstetrical patient with a high risk of postpartum hemorrhage and hemoglobin is between 80 g/L and 100 g/L | Discuss with Medical Director or designate on call. Requests for RBCs may be appropriate |
Indications and Dosing For Pediatric Patients Greater than 4 Months Corrected Age

<table>
<thead>
<tr>
<th>Hemoglobin Level and Indications</th>
<th>Recommendation and Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable patient with hemoglobin greater than 50 g/L and up to 70 g/L</td>
<td>Transfuse 10-15 mL/kg PRBCs over a recommended time of 3.5 hours and re-check patient symptoms and hemoglobin prior to transfusing again</td>
</tr>
</tbody>
</table>
| Stable patient with hemoglobin less than or equal to 50 g/L | Transfuse 10% of pre-transfusion hemoglobin level in mL/kg over a recommended time of 3.5 hours and re-check patient symptoms and hemoglobin prior to transfusing again  
(EXAMPLE: If pre-transfusion hemoglobin level is 40 g/L, then initial infusion rate is 4 mL/kg IV over a recommended time of 3.5 hours) |
| Patient is hematology/oncology patient with chemotherapy-induced cytopenias with hemoglobin less than or equal to 80 g/L | Transfuse 10-15 mL/kg PRBCs over a recommended time of 3.5 hours and re-check patient symptoms and hemoglobin prior to transfusing again |
| Patient is undergoing radiation therapy and hemoglobin less than or equal to 100 g/L | Transfuse as requested |

- For hemodynamically stable patients (adult and pediatric) a transfusion threshold of 70 g/L is appropriate.
- For adult and pediatric hematology/oncology patients with chemotherapy-induced cytopenia, a transfusion threshold of 80 g/L is considered appropriate, until further evidence becomes available.
- Transfusion may not be required in well compensated patients, such as those with chronic anemia, vitamin B12 deficiency or iron deficiency anemia, or where other therapies are available even when hemoglobin levels are below 70 g/L.
- The ordering clinician shall be aware of recipient risk factors for transfusion associated circulatory overload (TACO) and tactics to reduce risk as outlined in appendix F in the NSHA CL-BP-030, IWK-625 Blood Component and Blood Product Administration.
4.2. PLASMA

Exempted from the plasma guideline are massively bleeding patients and pediatric patients less than four months (corrected age).

Levels of factor V and factor VIII may be reduced in Frozen Plasma (FP) compared to Apheresis Fresh Frozen Plasma (AFFP). Both plasma components contain all clotting factors.

The following indications are illustrated on the Ordering Algorithm for Plasma in Appendix C.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Specific Criteria</th>
<th>Recommendation and Dose</th>
</tr>
</thead>
</table>
| Bleeding or requiring an invasive or operative procedure within 6 hours   | – INR is greater than 1.7  
– not on a vitamin K antagonist (e.g. Warfarin), low molecular weight heparin (LMWH), unfractionated heparin (UFH), direct oral anticoagulant (DOAC) or other anticoagulants | Adult dose: 10-15 mL/kg, e.g. a 75 kg adult would require 3-4 units of FP (250 mL/unit)  
Pediatric dose: 10-15 mL/kg                                                                                     |

*NOTE:*  
– Plasma requirements may increase when a consumptive process is ongoing  
– Prothrombin Complex Concentrate (PCC) (octaplex® or Beriplex®P/N) are recommended for adult patients on vitamin K antagonists with an INR greater than or equal to 1.7 and are bleeding or require a surgery/invasive procedure within 6 hours. There is insufficient published evidence to recommend the routine use of PCCs in the pediatric population. Consultation with a pediatric hematologist/oncologist is required (Refer to the Nova Scotia Guideline for the Use of Prothrombin Complex Concentrates in Patients on Vitamin K Antagonists and Direct Oral Anticoagulants)  
– Protamine sulfate is the treatment for prolonged aPTT (activated partial thromboplastin time) from heparin (if the patient is bleeding or will be undergoing an invasive procedure)

| Treatment of congenital or acquired thrombotic thrombocytopenic purpura | Dosing determined by patient’s plasma volume |
Plasma may also be indicated in therapeutic plasma exchange (TPE) if the INR is initially elevated or becomes elevated after repeated TPEs or when the TPE occurs shortly after a surgical procedure.

CSP may be used for this indication.

S/D plasma is indicated for patients who require a high volume of transfusions annually because they have TTP, HUS with associated factor H deficiency or clotting factor deficiencies for which specific licensed concentrates may not be readily available (e.g., factor V, factor XI, factor XIII) and who:

i. have experienced a severe allergic reaction to FP or

ii. have a pre-existing lung disorder or

iii. need FP but a blood group compatible product is not available in a timely manner.

### Indication

<table>
<thead>
<tr>
<th>Indication</th>
<th>Specific Criteria</th>
<th>Recommendation and Dose</th>
</tr>
</thead>
</table>
| Disseminated intravascular coagulopathy (DIC)                                                                                | • INR greater than 1.7  
  • Life-threatening bleeding                                                             | Adult dose – 10-15 mL/kg,  
  Pediatric dose – 10-15 mL/kg                                                       |
| Coagulation factor replacement when a factor concentrate is not available (e.g., Factor II, Factor V, Factor X deficiency) or the factor concentrate is contraindicated (e.g., Factor XI deficiency in a patient with high thrombotic risks) | • INR greater than 1.7 or an aPTT greater than 1.5 times normal  
  • bleeding or scheduled for an invasive or surgical procedure                          | Contact the Bleeding Disorder Clinic  
  Adult: 902-473-5612 (after hours – contact the hematologist on call 902-473-2222)  
  Pediatric: 902-470-8752 (after hours – contact the hematologist on call 902-470-8888) |

- The ordering clinician shall be aware of recipient risk factors for transfusion associated circulatory overload (TACO) and tactics to reduce risk as outlined in appendix F in the NSHA CL-BP-030, IWK-625 Blood Component and Blood Product Administration.

### NOTE:

The anticoagulant effect of the following antithrombotics will not be reversed by the administration of vitamin K or plasma – DO NOT transfuse plasma to reverse an elevated aPTT or INR.

- Direct thrombin inhibitors:
  - Argatroban (Argatroban®), Bivalirudin (Angiomax®), Dabigatran (Pradax®)

- Factor Xa inhibitors:
  - Direct – Apixaban (Eliquis®), Edoxaban (Lixiana®), Rivaroxaban (Xarelto®)
  - Indirect – Fondaparinux (Arixtra®)
4.3. CRYOPRECIPITATE

Exempt from the cryoprecipitate guideline are massively bleeding patients and pediatric patients less than four months (corrected age).

A fibrinogen level is required for cryoprecipitate appropriateness.

Cryoprecipitate provides a source of fibrinogen, coagulation factors VIII, XIII, von Willebrand factor (AHF-VWF) and fibronectin.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Specific Criteria</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital fibrinogen deficiency</td>
<td>• bleeding or the risk of bleeding AND fibrinogen concentrate is NOT available</td>
<td>Consultation with the Bleeding Disorder Clinic is suggested</td>
</tr>
<tr>
<td></td>
<td>• fibrinogen level less than 1.5 g/L</td>
<td><strong>Adult:</strong> 902-473-5612 (after hours – contact the hematologist on call 902-473-2222)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Pediatric:</strong> 902-470-8752 (after hours – contact the hematologist on call 902-470-8888)</td>
</tr>
<tr>
<td>Acquired hypofibrinogenemia</td>
<td>• bleeding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• fibrinogen levels less than 1.5 g/L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: Fibrinogen concentrate is an approved alternative for cryo in this situation</td>
<td></td>
</tr>
<tr>
<td>Acquired hypofibrinogenemia with DIC</td>
<td>• bleeding</td>
<td>In bleeding Adults: 10 units will provide 1.2-1.8 g of fibrinogen. One unit of cryoprecipitate per 10 kg body weight will raise the plasma fibrinogen by approximately 0.5 g/L. Pediatric dosing: 1 unit per 10 kg body weight or 6 units/m²</td>
</tr>
<tr>
<td></td>
<td>• fibrinogen levels less than 1.5 g/L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• if fibrinogen levels are greater than 1.5 g/L in the setting of active bleeding secondary to DIC, consider FP instead of cryoprecipitate to address the multiple factor deficiencies typical of DIC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: Fibrinogen concentrate is an approved alternative for cryo in this situation</td>
<td></td>
</tr>
<tr>
<td>Acquired hypofibrinogenemia in postpartum hemorrhage</td>
<td>• bleeding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• consider fibrinogen replacement when the fibrinogen level is greater than or equal to 2 g/L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• require fibrinogen replacement when the fibrinogen level is less than 2 g/L</td>
<td></td>
</tr>
</tbody>
</table>
Specific factor deficiencies:
- von Willebrand (vWD) disease
- Hemophilia A (HA)
- Factor XIII deficiency

| Cryoprecipitate is not the first choice for treatment and should ONLY be considered if the specific factor product is NOT available AND bleeding or requiring an invasive procedure | Consultation with the Bleeding Disorder Clinic is suggested
Adult: 902-473-5612 (after hours – contact the hematologist on call 902-473-2222)
Pediatric: 902-470-8752 (after hours – contact the hematologist on call 902-470-8888) |

Fibrinogen replacement therapy “plays an important role in the management of bleeding in cardiac surgery, trauma and obstetrical bleeding”26 however there is limited evidence providing the optimal dose or the optimal replacement product (cryoprecipitate or fibrinogen concentrate).
4.4. PLATELETS

Exempt from the platelet guideline are massively bleeding patients and pediatric patients less than four months (corrected age).

Platelet counts must be obtained within 24 hours of the request with the exception of outpatients which must be obtained within 96 hours of the request.

There is a lack of evidence to suggest a special platelet threshold is required for antiplatelet therapy patients.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Platelet Count</th>
<th>ADULT Recommendation and Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Immune thrombocytopenia purpura (ITP) with major bleeding</td>
<td>Less than $10 \times 10^9/L$</td>
<td>1 unit</td>
</tr>
<tr>
<td>• Bone marrow failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hematopoietic stem cell transplantation/chemotherapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Therapy-induced hypoproliferative thrombocytopenia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE** – The trigger for platelet transfusion may be higher when the patient’s platelet count must be a specific level, as determined by the treatment protocol, for chemotherapy administration or concurrent anticoagulation.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Platelet Count</th>
<th>ADULT Recommendation and Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Elective central venous catheter placement in internal jugular vein or femoral vein</td>
<td>Less than $20 \times 10^9/L$</td>
<td>1 unit</td>
</tr>
<tr>
<td>• Non-surgical invasive procedures including paracentesis, thoracentesis other than epidural anesthesia or lumbar puncture</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE** – Interventional Radiology may require higher platelet level triggers/targets to perform a procedure.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Platelet Count</th>
<th>ADULT Recommendation and Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Elective central venous catheter placement in subclavian vein</td>
<td>Less than $50 \times 10^9/L$</td>
<td>1 unit</td>
</tr>
<tr>
<td>• Elective diagnostic lumbar puncture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Major elective non-neuraxial surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Other significant bleeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Head trauma or CNS hemorrhage</td>
<td>Less than $100 \times 10^9/L$</td>
<td>1 unit and check platelet count</td>
</tr>
<tr>
<td>• CNS surgery</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- Platelet transfusions are indicated for prophylaxis against bleeding or for management of acute bleeding in patients with thrombocytopenia or platelet dysfunction
- In general 1 unit raises the platelet count by approximately 15-25 x 10⁹/L

<table>
<thead>
<tr>
<th>Indication</th>
<th>Platelet Count</th>
<th>Pediatric Patients Greater Than 4 Months Corrected Age Recommendation and Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Immune thrombocytopenia purpura (ITP) with major bleeding</td>
<td>Less than 10 x 10⁹/L</td>
<td>Body weight less than or equal to 20 kg, give 10-15 mL/kg</td>
</tr>
<tr>
<td>• Bone marrow failure</td>
<td></td>
<td>Body weight greater than 20 kg, give 1 unit of platelets</td>
</tr>
<tr>
<td>• Hematopoietic stem cell transplantation/chemotherapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Therapy-induced hypoproliferative thrombocytopenia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Severe mucositis</td>
<td>Less than or equal to 20 x 10⁹/L</td>
<td>Body weight less than or equal to 20 kg, give 10-15 mL/kg</td>
</tr>
<tr>
<td>• Sepsis</td>
<td>Less than or equal to 50 x 10⁹/L</td>
<td>Body weight greater than 20 kg, give 1 unit of platelets</td>
</tr>
<tr>
<td>• DIC in the absence of bleeding</td>
<td></td>
<td></td>
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<tr>
<td>• Anticoagulant therapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Risk of bleeding due to local tumor infiltration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Insertion of non-tunneled CVL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Elective central venous catheter placement in subclavian vein</td>
<td>Less than or equal to 50 x 10⁹/L</td>
<td>Give the following immediately before procedure and recheck platelet count again before starting procedure:</td>
</tr>
<tr>
<td>• Elective diagnostic lumbar puncture</td>
<td></td>
<td>Body weight less than or equal to 20 kg, give 10-15 mL/kg</td>
</tr>
<tr>
<td>• Major elective non-neuraxial surgery</td>
<td></td>
<td>Body weight greater than 20 kg, give 1 unit of platelets</td>
</tr>
<tr>
<td>• Other significant bleeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Head trauma or CNS hemorrhage</td>
<td>Less than or equal to 100 x 10⁹/L</td>
<td>Body weight less than or equal to 20 kg, give 10-15 mL/kg</td>
</tr>
<tr>
<td>• CNS surgery</td>
<td></td>
<td>Body weight greater than 20 kg, give 1 unit of platelets</td>
</tr>
</tbody>
</table>
5. REFERENCES


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APPENDIX A – APPROPRIATE BLOOD COMPONENTS WORKING GROUP (ABC WG)

The Nova Scotia Provincial Blood Coordinating Team (NSPBCT) acknowledges the tremendous and diligent work of the provincial ABC Working Group for providing valuable expertise in the development of this guideline.

<table>
<thead>
<tr>
<th>Appropriate Blood Components Working Group</th>
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<tbody>
<tr>
<td><strong>Dr. Sudeep Shivakumar</strong></td>
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<td><strong>Dr. William Beveridge</strong></td>
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<td><strong>Dr. Grayson Lloyd</strong></td>
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<td><strong>Dr. Lynne McLeod</strong></td>
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<td><strong>Dr. Jennifer Duncan</strong></td>
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<td><strong>Dr. Kevork Peltekian</strong></td>
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**NSPBCT**

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<tr>
<td>Jennifer LeFrense</td>
<td>Manager</td>
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<td>Jill Wilson</td>
<td>Utilization Management Coordinator</td>
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<td>Michael Farrell</td>
<td>Utilization Management Coordinator</td>
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**Consultations**

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<tr>
<td>Dr. Bruce MacAulay</td>
<td>Department of Anesthesia, Women and Obstetrics</td>
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<td>IWK Health Centre</td>
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<td>Dr. Robert Nunn</td>
<td>Chief of Anesthesia, Women and Obstetrics</td>
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<td>IWK Health Centre</td>
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<tr>
<td>Dr. K. S. Robinson</td>
<td>Hematologist, Director of the Provincial Adult Bleeding Disorder Clinic</td>
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<td>QEII Health Sciences Centre</td>
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APPENDIX B – NOVA SCOTIA RED BLOOD CELL TRANSFUSION PATHWAY

Patient has the following:
- Bleeding – active* / massive/suspected
- Acute coronary syndrome
- Chronically transfused
- Pediatric patient less than 4 months corrected age
- Intrauterine transfusions

Patient has one or more of the following conditions:
- Adult undergoing orthopedic or cardiac surgery
- Hematology/Oncology patient with chemotherapy induced cytopenia
- Pre-existing cardiovascular disease
- Undergoing radiation treatment

All Hgb levels must be within 24 hours except Outpatients which must be within 96 hours

All other patients – what is Hgb level?

Hgb less than or equal to 80 g/L (100 g/L for radiation patients)

Hgb greater than 70 g/L

Hgb less than or equal to 70 g/L

Call patient care area and request Hgb level

Call patient care area and request Hgb level

Transfuse as requested

Is the transfusion being administered in an outpatient setting or during dialysis?

Adult: Transfuse 1 unit of RBCs
Pediatric: Transfuse 10-15 mL/kg PRBCs over a recommended time of 3.5 hours

Is this the first unit/dose ordered in a 24 hour period?

Was the Hgb done after previously dispensed unit(s)/dose(s) transfused?

Call patient care area and inform them:
"The order for RBC does not meet our recommendations for appropriateness at this time. The Clinician must contact the Medical Director or designate on call for consult before RBCs can be dispensed". Note: Requests of RBCs for Hgb between 80 g/L and 100 g/L may be appropriate during pregnancy.

*Actively bleeding: the presence of an overt discharge of blood occurring either grossly (e.g. gastrointestinal bleeding) or internally (e.g. retroperitoneal bleeding seen on imaging).

*The order for RBC does not meet our recommendations for appropriateness at this time.* The Clinician must contact the Medical Director or designate on call for consult before RBCs can be dispensed without a Hgb after the transfusion of previously dispensed unit(s)/dose(s).
APPENDIX C – ORDERING ALGORITHM FOR PLASMA

TTP/HUS Treatment

Disseminated intravascular coagulation (DIC)

- INR greater than 1.7?
  - YES: Plasma not indicated
  - NO: Plasma indicated

- NO: Disseminated intravascular coagulation (DIC)

Bleeding and/or requiring an invasive procedure/surgery within 6 hours

- INR greater than 1.7?
  - YES: Plasma not indicated
  - NO: Plasma indicated

- NO: Bleeding and/or requiring an invasive procedure/surgery within 6 hours

Coagulation Factor Deficiency

Specific Factor Product NOT available (i.e. Factor V deficiency) or CONTRAINDICATED (i.e. Factor XI deficiency with high thrombotic risks)

- NO: Specific Factor Product NOT available

- YES: Specific Factor Product CONTRAINDICATED

- NO: Plasma not indicated

- YES: Plasma indicated

Plasma not indicated. Refer to Nova Scotia Guideline for the Use of Prothrombin Complex Concentrates in Patients on Vitamin K Antagonists and Direct Oral Anticoagulants

On a vitamin K antagonist (Coumadin/Warfarin), Low molecular weight heparin, unfractionated heparin, direct oral anticoagulant or other anticoagulant

- NO: Plasma not indicated

- YES: Plasma indicated

Call patient care area and request an INR

- NO: Plasma not indicated

- YES: Plasma indicated

Plasma Indicated

Contact the Bleeding Disorder Clinic
Adult (902) 473-5612 (after hours – contact the hematologist on call 902-473-2222)
Pediatric (902) 470-8752 (after hours – contact the hematologist on call 902-470-8888)