

# Perioperative Blood Conservation Program

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## Intraoperative Autologous Blood Collection and Transfusion

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### Purpose:

To provide patients with alternatives to allogeneic blood transfusion, as appropriate for their medical/surgical health status

### Introduction:

To meet the requirements of the Canadian Standards Association Z902-4 Blood and Blood Components and the Canadian Society for Transfusion Medicine Standards for Hospital Transfusion Services the following protocols have been established:

1. **Protocol for Labeling and Documentation of Transfusion**
2. **Protocol for Cell Salvage (Autologous Shed Blood Collection, Processing and Administration)**
3. **Protocol for Acute Normovolemic Hemodilution (ANH)**

### Quality Controls:

- Protocols will be reviewed by the Perioperative Blood Conservation Committee with regard to patient outcome data on a quarterly basis. Recommendations for protocol revision and/or patient care issues should be forwarded to the Director of the Perioperative Blood Conservation Program
- Measures to ensure equipment functions as expected per LHSC Biomedical Technology.
- Materials for collection, processing, testing, storing or administering components must be used according to manufacturers' specifications
- All components and critical materials used in processing, lab samples, and patient records must be identified and traceable
- Individuals performing critical steps in collection, processing, administration of component must be identified on the patient's health record
- Specific process for components known to contain infectious agents must be identified

### Contact Information:

For omissions or concerns with any of the information in this document please contact:

Donna Berta, RN BScN  
Blood Conservation Program Coordinator  
519-685-8500 ext 32707  
[Donna.Berta@lhsc.on.ca](mailto:Donna.Berta@lhsc.on.ca)

For Medical or Clinical information regarding the Perioperative Blood Conservation Program, please contact:

Dr Fiona Ralley  
Director, Perioperative Blood Conservation Program  
519-685-8500 ext 35737  
[fralley@uwo.ca](mailto:fralley@uwo.ca)

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### Protocol for Labeling and Documentation of Transfusion

| Protocol                           | Procedure Outline/Rationale   |
|------------------------------------|---|
| <p><b>1. Labeling Criteria</b></p> | <ul style="list-style-type: none"> <li>▪ As per Health Canada/Canadian Standards Association: Each unit of autologous blood (cardiopulmonary bypass pump blood, cell salvage blood, ANH blood) collected intraoperatively shall be labeled with the patient's first name, last name, personal identification number (P.I.N), date and time of initiation of collection, date and time of unit expiration and the statement "For Autologous Use Only"</li> <li>▪ Only generic " For Autologous Use Only" labels provided by the Blood Transfusion Laboratory (BTL) will be utilized (labels supplied by the BTL will prevent glue from potentially leaching into the blood)</li> </ul> <p>Minimum label requirements are: 4 labels per cardiopulmonary bypass case, 2 labels per cell salvage case, and 2 labels per unit of ANH blood</p>   |
| <p><b>2. Requesting Labels</b></p> | <ul style="list-style-type: none"> <li>▪ For <b>ELECTIVE cardiopulmonary bypass cases</b> (noted as such on the OR (Operating Room) schedule) the OR clerk preparing the patient's chart will addressograph with the patient's blue card 3 generic " For Autologous Use Only" labels and paper clip them to the patient's Cardiopulmonary Bypass Record (Document number: NS 0111 (Rev 2005/03/19))</li> <li>▪ For <b>ELECTIVE cell salvage cases</b> (noted as such on the OR schedule by the Special Consideration Code "CS") the OR clerk preparing the patient's chart , or the perfusionist assigned to the patient's care, will addressograph with the patient's blue card 2 generic " For Autologous Use Only" labels and paper clip them to the patient's Cell Salvage Record (Document number: NS 5649 (2006/06/26))</li> <li>▪ For <b>ELECTIVE ANH cases</b> (requested by the attending Anesthesiologist) the circulating nurse will addressograph with the patient's blue card "For Autologous Use Only" labels and paper clip them to the Anesthesia Record (Document number: NS 4109 (extended record (2000/12/19)) (2 labels per each unit of ANH blood to be collected)</li> <li>▪ For <b>EMERGENCY cases</b> generic " For Autologous Use Only" labels will be addressographed with the patient's blue card as requested</li> </ul> <p>The BTL will provide to the Operating Room generic "For Autologous Use Only" labels as requested. The OR clerk ordering paper supplies will maintain inventory stock and telephone BTL for additional supply as required.</p> |

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|  | <p>Clinical Perfusion Services will maintain inventory stock with the Cell Salvage Device and telephone BTL for additional supply.</p>  |
| <p><b>3. Patient Identification</b></p>            | <ul style="list-style-type: none"> <li>▪ The Health Care Professional (Anesthesiologist, Perfusionist) performing the blood collection verifies the patient's first and last name and PIN number on each addressographed generic "For Autologous Use Only" label with the Admission and Discharge sheet (face sheet) and patient's armband</li> <li>▪ Confirmation of the patient's identification will be demonstrated by the signature of the Health Care Professional performing the blood collection on all labels, refer to sample label:<br/>CONFIRMATION OF PATIENT ID:<br/>_____</li> </ul>   |
| <p><b>4. Label Documentation and Placement</b></p> | <p>The following information must be documented on each label:</p> <ul style="list-style-type: none"> <li>▪ Confirmation of the patient's identification (see above)</li> <li>▪ The date and time of initiation of the blood collection</li> <li>▪ The date and time of expiry             <ul style="list-style-type: none"> <li>➢ 8 hours for cardiopulmonary bypass pump collections</li> <li>➢ 6 hours for cell salvage collections</li> <li>➢ 8 hours for ANH collections</li> </ul> </li> <li>▪ The source of the collected blood (refer to sample label):<br/>Cell saver__ ANH__ Pump__</li> </ul> <p>It is the responsibility of the Health Care Professional collecting the intra-operative autologous blood to:</p> <ul style="list-style-type: none"> <li>▪ Affix one label to the blood collection bag (repeat for each blood collection bag)</li> <li>▪ Retain the second label paper clipped to an addressograph stamped London Health Sciences Centre (LHSC) Laboratory Report sheet</li> <li>▪ Note: Proceed with blood collection as per cardiopulmonary bypass, cell salvage or ANH intra-operative autologous blood collection protocol</li> </ul> |

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| <p><b>5. Transfusion of Intra-operative Autologous Blood</b></p> | <ul style="list-style-type: none"> <li>▪ At the time of transfusion of intra-operative autologous blood collection, check the date and time of expiry of the collection as documented on the label. Discard any expired blood as per hazardous waste management practice.</li> <li>▪ If the transfusion is occurring in the OR, proceed with checking and transfusing the blood as per “Blood Administration in the Operating Room” Procedure</li> <li>▪ If the transfusion is occurring outside the OR, proceed with checking and transfusing the blood as per the <a href="#">Blood Transfusion Resource Manual</a></li> <li>▪ Document the transfusion of the intra-operative autologous blood collection by completing the<br/> Hung by: _____ Checked by: _____<br/> Transfusion Date/Time: _____<br/> portion of the both the label on the blood bag and the label for the patient’s Health Record</li> <li>▪ Affix the label for the patient’s Health Record to the LHSC Laboratory Report sheet</li> </ul> |
|--|--|

**Sample: Intra-operative Autologous Blood Label**

STAMP WITH PATIENT ADDRESSOGRAPH IN THIS SECTION

  
  

CONFIRMATION OF PATIENT ID:  
\_\_\_\_\_

Cell saver \_\_\_ ANH \_\_\_ Pump \_\_\_ VOLUME: \_\_\_\_\_ ml  
Collection Date/Time: \_\_\_\_\_  
Expiry Date/Time: \_\_\_\_\_  
Hung by: \_\_\_\_\_ Checked by: \_\_\_\_\_  
Transfusion Date/Time: \_\_\_\_\_

**FOR AUTOLOGOUS USE ONLY**

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### Protocol for Cell Salvage (Autologous Shed Blood Collection, Processing and Administration)

| Protocol   | Procedure Outline/Rationale   |
|--|---|
| <p><b>1. Documentation Requirements</b></p>                              | <ul style="list-style-type: none"> <li>▪ LHSC Clinical Perfusion Services Cardiac Care Cell Salvage Record (Document number: NS 5649)               <ul style="list-style-type: none"> <li>➢ Fresenius C.A.T.S. (Continuous AutoTransfusion System) device #</li> <li>➢ Istat, Point of Care testing device #</li> <li>➢ Suction/collection reservoir device utilized #</li> <li>➢ Volume of wash solution utilized</li> <li>➢ Pump speed Fresenius C.A.T.S. washing program utilized</li> <li>➢ Cell salvage blood product testing results and visual inspection</li> <li>➢ All processed PRC (packed red cells) transfused (volume, time transfused)</li> </ul> </li> <li>▪ Refer to:               <ul style="list-style-type: none"> <li>➢ Autologous Blood Collection and Transfusion Protocol for Labeling and Documentation of Transfusion</li> <li>➢ LHSC Blood Administration in the Operating Room Policy</li> <li>➢ <a href="#">Blood Transfusion Resource Manual</a></li> </ul> </li> </ul> |
| <p><b>2. Requesting Cell Salvage, Notifications, Doctor's Orders</b></p> | <p><b>For ELECTIVE Cell Salvage cases</b></p> <p><b>If request for Cell Salvage originates in Attending Surgeon's Office:</b></p> <p><b>1. Attending Surgeon's Office</b></p> <ul style="list-style-type: none"> <li>▪ Request cell salvage as far in advance of Surgery date as possible by notifying Clinical Perfusion Services by email (<a href="mailto:perfusion@lhsc.on.ca">perfusion@lhsc.on.ca</a>; address found in Novell GroupWise Address Book)</li> <li>▪ Information to be provided: Patient's name, PIN number, Surgical procedure, Surgery date and time, Surgeon</li> <li>▪ If Surgery date and time changes, this MUST be emailed to Clinical Perfusion Services as soon as possible</li> <li>▪ Ensure "Cell Saver" (i.e. Doctor's Order for collection of blood from patient-donor) is written on Preadmission Registration and Physicians Orders – Special OR/Procedure Equipment Needs</li> </ul>   |

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|  | <p><b>2. Preadmission Clinic Nurse</b></p> <ul style="list-style-type: none"> <li>▪ Document cell salvage code (CS) in SurgiNet Computer system OR Special Considerations based on “Cell Saver” (i.e. Doctor’s Order for collection of blood from patient-donor) written on Preadmission Registration and Physicians Orders – Special OR/Procedure Equipment Needs</li> </ul> <p><b>If request for Cell Salvage originates in Preadmission Clinic:</b></p> <p><b>1. Preadmission Clinic Nurse</b></p> <ul style="list-style-type: none"> <li>▪ Ensure “Cell Saver” (i.e. Doctor’s Order for collection of blood from patient-donor) is written on Preadmission Registration and Physicians Orders – Special OR/Procedure Equipment Needs and document cell salvage code (CS) in SurgiNet Computer system OR Special Considerations</li> <li>▪ Notify Attending Surgeon’s office</li> </ul> <p><b>2. Attending Surgeon’s Office:</b></p> <ul style="list-style-type: none"> <li>▪ Request cell salvage as far in advance of Surgery date as possible by notifying Clinical Perfusion Services by email (<a href="mailto:perfusion@lhsc.on.ca">perfusion@lhsc.on.ca</a>; address found in Novell GroupWise Address Book)</li> <li>▪ Information to be provided: Patient’s name, PIN number, Surgical procedure, Surgery date and time, Surgeon</li> <li>▪ If Surgery date and time changes, this MUST be emailed to Clinical Perfusion Services as soon as possible</li> </ul> <p><b>For EMERGENCY Cell Salvage cases:</b></p> <ul style="list-style-type: none"> <li>• Surgical care team will notify Perfusionist on-call (via switchboard pager system, 24-hour coverage)</li> <li>• Perfusion Services: ensure “Cell Salvage” (i.e. Doctor’s Order for collection of blood from patient-donor) written on Physicians Orders by Attending Surgeon/Anesthesiologist requesting cell salvage</li> </ul> |
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|  |   |
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| <p><b>3. Collection</b><br/><b>3.1 Clinical Applications</b></p> | <p><b>Indications:</b></p> <ul style="list-style-type: none"> <li>▪ Anticipated blood loss to require transfusion</li> <li>▪ Anticipated bleeding into sterile field</li> </ul> <p><b>Contraindications:</b></p> <ul style="list-style-type: none"> <li>▪ <b>Absolute:</b> <ul style="list-style-type: none"> <li>➢ Sepsis</li> <li>➢ Bacterial contamination of wound (meconium, bile, fecal matter, ascites, urine, amniotic, gastric or pancreatic fluids)</li> <li>➢ Sickle cell disease</li> <li>➢ Pheochromocytoma</li> </ul> </li> <li>▪ <b>Relative</b> <ul style="list-style-type: none"> <li>➢ Malignant Disease</li> <li>➢ Presence of any medications not intended for IV use (alcohol, betadine, hydrogen peroxide, methylmethacrylate, topical antibiotics (bactracin, neomycin, polymixin, neosporin), topical hemostatic agents (gelfoam, instat, thrombin)</li> </ul> </li> <li>• If patient known to carry blood transmitted infectious agents, cell salvage blood transfusion must be completed prior to the patient leaving the Operating Room</li> <li>• Any exceptions to be considered at the discretion of the Attending Surgeon and/or Anesthesiologist</li> </ul> |
| <p><b>3.2 Vacuum requirements</b></p>                            | <ul style="list-style-type: none"> <li>• No wall suction collection of surgical field blood</li> <li>• Wall suction control to be set at 100 mmHg to avoid excess red cell destruction yet maintain clear surgical field (in situations of extreme bleeding to facilitate visualization of surgical field suction may have to be increased to 150-200 mmHg)</li> <li>• Utilization of large bore suction tip and avoidance of surface skimming of blood to limit hemolysis</li> </ul>   |
| <p><b>3.3 Anticoagulant Solution</b></p>                         | <ul style="list-style-type: none"> <li>• Heparinized normal saline: 30,000 units heparin/1000 ml 0.9% NaCl</li> <li>• Circuit prime with 200 ml of solution, then 40-80 cc/hr infusing with collected blood</li> </ul>  |

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| <p><b>3.4 Circuit Configuration</b></p>                          | <ul style="list-style-type: none"> <li>Fresenius Continuous Autotransfusion System (C.A.T.S.) device<br/><b>Refer to Product Manual: <i>Operating Instructions for C.A.T.S Autotransfusion System</i></b> (located in Clinical Perfusion Services Office)</li> <li>Blood saturated sponges can be squeezed out (soaked in 0.9% NACL) in a sterile bowl and suctioned to the collection reservoir for processing</li> <li>Whenever feasible, reinfusion bags should be utilized for transfusion of the final product</li> </ul>  |                             |   |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |
|--|---|-----------------------------|---|-----------------------------|----------------------|--------------|---|----|--------------------------------------|------------|---|----|------------------|--------------|---|----|------------------|----------------|---|----|---|-----------------|---|----|---|----------------|---|-----|--|
| <p><b>3.5 Wash Volumes</b></p>                                   | <ul style="list-style-type: none"> <li>Only sterile 0.9% NaCl will be used to wash shed blood</li> </ul>  |                             |   |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |
| <p><b>3.6 Pump Speed</b></p>                                     | <p style="text-align: center;"><b>Fresenius C.A.T.S. Washing Program Selection</b></p> <table border="1" data-bbox="609 831 1416 1360"> <thead> <tr> <th>Program</th> <th>Washing Factor</th> <th>Pre-set Flow rates (ml/min)</th> <th>Field of application</th> </tr> </thead> <tbody> <tr> <td>High Quality</td> <td>7</td> <td>30</td> <td>Highly contaminated or damaged blood</td> </tr> <tr> <td>Low Volume</td> <td>7</td> <td>25</td> <td>Low blood losses</td> </tr> <tr> <td>Quality wash</td> <td>5</td> <td>35</td> <td>Standard program</td> </tr> <tr> <td>High Flow Wash</td> <td>3</td> <td>50</td> <td>Fast Processing of blood losses with high quality blood</td> </tr> <tr> <td>Ultra Flow Wash</td> <td>1</td> <td>70</td> <td>Fast Processing of blood losses with high quality blood</td> </tr> <tr> <td>Emergency Wash</td> <td>1</td> <td>100</td> <td>Quick Access to ultra flow wash with maximum flow rate</td> </tr> </tbody> </table> | Program                     | Washing Factor  | Pre-set Flow rates (ml/min) | Field of application | High Quality | 7 | 30 | Highly contaminated or damaged blood | Low Volume | 7 | 25 | Low blood losses | Quality wash | 5 | 35 | Standard program | High Flow Wash | 3 | 50 | Fast Processing of blood losses with high quality blood | Ultra Flow Wash | 1 | 70 | Fast Processing of blood losses with high quality blood | Emergency Wash | 1 | 100 | Quick Access to ultra flow wash with maximum flow rate |
| Program  | Washing Factor  | Pre-set Flow rates (ml/min) | Field of application                                    |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |
| High Quality   | 7   | 30                          | Highly contaminated or damaged blood                    |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |
| Low Volume   | 7   | 25                          | Low blood losses  |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |
| Quality wash   | 5   | 35                          | Standard program  |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |
| High Flow Wash   | 3   | 50                          | Fast Processing of blood losses with high quality blood |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |
| Ultra Flow Wash  | 1   | 70                          | Fast Processing of blood losses with high quality blood |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |
| Emergency Wash   | 1   | 100                         | Quick Access to ultra flow wash with maximum flow rate  |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |
| <p><b>3.7 Processing volume requirements - small volumes</b></p> | <ul style="list-style-type: none"> <li>Due to the nature of the coil centrifuge technology of the Fresenius C.A.T.S., only small volumes of shed blood are required to be collected in the reservoir to initiate processing</li> <li>If the major blood loss of the surgical procedure has occurred and the volume of shed blood/anticoagulant in the collection reservoir is less than 500 ml, the Attending Surgeon/Anesthesiologist will determine if processing of the shed blood is to occur or if the volume of shed blood/anticoagulant collected in the reservoir is to be discarded</li> </ul>   |                             |   |                             |                      |              |   |    |                                      |            |   |    |                  |              |   |    |                  |                |   |    |   |                 |   |    |   |                |   |     |  |

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| <p><b>3.8 Cell Salvage Blood Safety Testing</b></p>                   | <ul style="list-style-type: none"> <li>• As a minimum, prior to the initial cell salvage blood transfusion and subsequently for every volume of 1000 ml of salvaged blood processed, hematocrit (Hct) and potassium (K) will be checked utilizing Istat point of care testing</li> <li>• Minimum acceptable results:             <ul style="list-style-type: none"> <li>➢ Hct: 50 % or greater</li> <li>➢ K: 5.0 mml/dl or less</li> </ul> </li> <li>• Visual inspection of cell salvage blood and its container for any defects</li> <li>• Transfusion or disposal of any cell salvage blood not meeting the requirements will be at the discretion of the Attending Surgeon/Anesthesiologist</li> <li>• Volume of cell salvage blood transfused will be noted on the Intra-Operative Autologous Blood Collection Label and the Cell Salvage Record</li> </ul> |
| <p><b>3.9 Cell Salvage Blood Transfusion Time Frames</b></p>          | <ul style="list-style-type: none"> <li>• Transfusion of processed intra-operative autologous shed blood must occur within 6 hours of initiating collection</li> </ul>   |
| <p><b>4. Administration</b><br/><b>4.1 Patient Identification</b></p> | <ul style="list-style-type: none"> <li>▪ Refer to:             <ul style="list-style-type: none"> <li>➢ Autologous Blood Collection and Transfusion Protocol for Labeling and Documentation of Transfusion</li> <li>➢ LHSC Blood Administration in the Operating Room Policy</li> <li>➢ <a href="#">Blood Transfusion Resource Manual</a></li> </ul> </li> </ul>  |
| <p><b>4.2 Minimization of Air Embolism</b></p>                        | <ul style="list-style-type: none"> <li>• In anticipation of potential rapid transfusion, a 600 cc transfer pack may be utilized; ensure all air is expelled from the transfer bag prior to sealing off the transfer tubing</li> <li>• Avoid use of a pressure bag on the 1000cc collection bag</li> </ul>   |
| <p><b>4.3 Addition of Drugs and Solutions</b></p>                     | <ul style="list-style-type: none"> <li>• Only 0.9 % NaCl shall be added to cell salvage blood</li> </ul>  |

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| <p><b>4.4 Transfusion Guidelines</b></p> | <ul style="list-style-type: none"> <li>• Attending Anesthesiologist is responsible for initiation of Cell Salvage/Cardiopulmonary Bypass Pump/Acute Normovolemic Hemodilution/ Pre-operative Autologous/Allogeneic blood transfusion</li> <li>• When feasible check Istat Hb prior to initiation of transfusion and upon completion of transfusion/just prior to patient leaving the operating room</li> <li>• When patient's condition permits:             <ul style="list-style-type: none"> <li>➢ Cardiopulmonary Bypass Pump blood and Cell Salvage blood must be transfused prior to ANH blood/ pre-operative autologous donated/allogeneic blood</li> <li>➢ ANH blood must be transfused prior to pre-operative autologous donated/allogeneic blood</li> </ul> </li> <li>▪ Ideally, Cell Salvage blood transfusion will be initiated at wound closure: may transfuse prior to wound closure if transfusion trigger indicates (Hb &lt; or = 80; Ischemic ECG changes; trigger specific to patient risk factors – age, CAD)</li> <li>• As patient's condition and final OR Hb result indicate Cell Salvage blood/Cardiopulmonary Bypass Pump blood/ANH blood transfusion may be initiated in the OR or be sent with the patient to PACU/ICU and re-assess the patient's transfusion requirement prior to blood expiry timeframe</li> <li>• If RBC transfusion equivalent to patient's calculated blood volume has been required, consider possible need for fresh frozen plasma, platelet, cryoprecipitate transfusion</li> <li>• Unless patient's condition or final Operating Room Istat indicate otherwise, recheck CBC POD # 1</li> <li>• If CBC rechecked within first 12 hours post-op, consider result in light of patient's fluid status</li> </ul> |
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### Protocol for Acute Normovolemic Hemodilution (ANH)

| Protocol  | Procedure Outline/Rationale   |
|---|---|
| <b>1. Select patient as ANH candidate based on clinical applications</b>  | <p style="text-align: center;"><b>Clinical applications for ANH</b></p> <p><b>Indications:</b></p> <ul style="list-style-type: none"> <li>• Surgical procedure with minimum expected blood loss of 1000 ml</li> <li>• CBC pre-op: hematocrit &gt; 0.40 and hemoglobin &gt; 130</li> </ul> <p><b>Contraindications:</b></p> <ul style="list-style-type: none"> <li>• Left Ventricular Ejection Fraction &lt; 40 %</li> <li>• Unstable Angina – new or worse within 30 days</li> <li>• Severe Aortic or Mitral Stenosis</li> <li>• Hepatic Disease – Cirrhosis, Active Hepatitis</li> <li>• Renal Disease – Requiring Dialysis</li> <li>• Hematological Disease – Bleeding Disorders</li> <li>• Active infection</li> <li>• Latex Allergy (collection bags are not latex free)</li> </ul> <p>If patient known to carry blood transmitted infectious agents, ANH blood transfusion must be completed prior to the patient leaving the Operating Room</p> <p>Any exceptions to be considered at the discretion of the Attending Surgeon and/or Anesthesiologist</p> |
| <b>2. Calculate volume of blood to be removed (calculated amount is a guide as to the number of units to be bled)</b> | <p><b>Calculation:</b></p> $\text{Volume} = \text{EBV} \times \frac{(\text{initial hct} - \text{final hct})}{\text{average hct}}$ <ul style="list-style-type: none"> <li>➤ EBV = _____ kg x 70 (Male) or 60 (Female)</li> <li>➤ Average Hct = <math>\frac{\text{initial hct} - \text{final hct}}{2}</math></li> <li>➤ Initial hct = OR day preoperative value</li> <li>➤ Final (or Target) hct = 0.30 (hemoglobin = 100 g/dl)</li> </ul> <ul style="list-style-type: none"> <li>▪ Maximum number of units to be bled = 3</li> <li>▪ Document calculation on LHSC Anesthesia Record</li> </ul>   |

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| <p><b>3. Equipment</b></p>                              | <p>Request OR circulating nurse to obtain: (refer to Protocol for Labeling and Documentation of Transfusion – Requesting labels)</p> <ul style="list-style-type: none"> <li>• Labels for intra-operative autologous blood collection</li> <li>• CPDA-1 blood collection bags (from Blood Transfusion Laboratory)</li> <li>• Blood Rocker: Storage Location<br/>UH: Perfusion Storage Room A2-120<br/>VH: Sterile Processing Department (call 52108 to request, send Porter/PSA to obtain)</li> </ul>  |
| <p><b>4. Usual OR procedures</b></p>                    | <p>Anesthesia, central line, large bore IV</p>  |
| <p><b>5. Calibrate the Rocker</b></p>                   | <p><b>Rocker Calibration (to be done once daily)</b></p> <ol style="list-style-type: none"> <li>1. Ensure nothing is resting on or against Rocker shroud assembly.<br/>Position the calibration weight with the hinged counterweight pointing away from the two bag pegs.</li> <li>2. Turn the Rocker on.<br/>Note the alarm and light do not come on.</li> <li>3. Turn the Rocker off.<br/>Flip the hinged counterweight towards the two bag pins.<br/>Turn the Rocker on.<br/>Note the alarm and light come on.</li> <li>4. If the Rocker responds as above, it is calibrated<br/>If not, turn the weight adjustment knob one or two clicks<br/>(If the light and alarm came on in step 2, turn the weight adjustment knob to the right to make the bag heavier<br/>If the light and alarm did not come on in step 3, turn the weight adjustment knob to the left to make the bag lighter)</li> </ol> <p>Repeat steps 1 to 3; continue until the Rocker is calibrated</p> |
| <p><b>6. Label and number blood collection bags</b></p> | <ul style="list-style-type: none"> <li>• Refer to Protocol for Labeling and Documentation of Transfusion - Patient Identification, Label Documentation, Affixing Label to Autologous Collection Bag</li> <li>• Number the units collected (1,2,3) on the label to be affixed to the blood collection bag and on the label retained for documentation of transfusion</li> </ul>  |

**Date effective: July 2006**

**Date revised: June 2009**

## Perioperative Blood Conservation Program

### Intraoperative Autologous Blood Collection and Transfusion

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| <p><b>7. Prepare blood collection bag on Rocker</b></p> | <p><b>Rocker\Blood Bag Preparation</b></p> <ol style="list-style-type: none"> <li>1. The Rocker must rest on a level surface below the level of the donor site</li> <li>2. Position the slot in the blood bag over both of the bag pegs located on the shroud assembly</li> <li>3. Loosely loop 3 knots in the length of tubing between the needle and the blood bag</li> <li>4. Thread the tubing through the clamp slot in the rocker neck with 2 of knots between the blood bag and the clamp slot</li> <li>5. Make sure the tubing is completely seated in the clamp by sliding it up and down in the slot</li> <li>6. Keep a small amount of tubing slack between the blood bag and clamp to ensure the blood bag does not lift off the bag tray when the Rocker is mixing</li> </ol>  |
| <p><b>8. Collect the blood</b></p>                      | <p><b>Blood Collection</b></p> <ol style="list-style-type: none"> <li>1. Turn the Rocker on to initiate mixing action</li> <li>2. Close to the needle, clamp the blood bag tubing with a hemostat</li> <li>3. Using aseptic technique, attach the needle to the patient's central line</li> <li>4. Release the hemostat to collect the blood</li> <li>5. Premature stoppage of blood flow may result if it becomes necessary to adjust the blood bag once the Rocker is mixing. The alarm sounding and the red light illuminating indicate this. Reset the Rocker by turning the switch off and immediately back on. The collection will continue until the weight is reached.</li> <li>6. When the weight is reached, the Rocker will sound an audible alert, the red indicator light will illuminate, and the blood bag tubing will be clamped. The Rocker continues to mix blood and anticoagulant. The Rocker does not require immediate attention at this time. It is recommended that mixing may continue until the process is discontinued.</li> <li>7. To discontinue, clamp the blood bag tubing with a hemostat close to the needle. Turn the Rocker off. The Rocker will unclamp the tubing. Tightly secure the 3 loosely looped knots in the blood bag tubing. Cut the tubing close to the 2 knots near the blood bag. Discard the needle and tubing as per LHSC policy.</li> </ol> |

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# Perioperative Blood Conservation Program

## Intraoperative Autologous Blood Collection and Transfusion

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| <b>9. Fluid Replacement</b>                                     | <b>Guideline for fluid replacement:</b> <ul style="list-style-type: none"> <li>▪ Fluid replacement for units 1 and 2 - Pentaspan 1:1 (500 ml x 2)</li> <li>▪ Fluid replacement for unit 3 - Crystalloid 3:1 (1500 ml)</li> </ul>   |
| <b>10. Usual intra-operative routines</b>                       | <ul style="list-style-type: none"> <li>▪ Maintain fiO<sub>2</sub> as needed (consider 100% O<sub>2</sub>)</li> <li>▪ Document blood collected, fluid replacement on LHSC Anesthetic Record</li> <li>▪ Blood work: also check Istat Hb after ANH blood collection completed, after major blood loss event</li> </ul>  |
| <b>11. ANH Blood Transfusion Time Frames</b>                    | <ul style="list-style-type: none"> <li>• ANH blood collections can remain at room temperature for up to 8 hours post collection</li> <li>• Once collection is completed, further mixing of the blood is not required</li> <li>• Transfusion of ANH blood collections must occur within 8 hours of initiating the collection</li> </ul>                           |
| <b>12. Administration</b><br><b>12.1 Patient Identification</b> | <ul style="list-style-type: none"> <li>▪ Refer to:             <ul style="list-style-type: none"> <li>➤ Autologous Blood Collection and Transfusion Protocol for Labeling and Documentation of Transfusion</li> <li>➤ LHSC Blood Administration in the Operating Room Policy</li> <li>➤ <a href="#">Blood Transfusion Resource Manual</a></li> </ul> </li> </ul> |

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# Perioperative Blood Conservation Program

## Intraoperative Autologous Blood Collection and Transfusion

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### 12.2 Transfusion Guidelines

- Attending Anesthesiologist is responsible for initiation of Cell Salvage/Cardiopulmonary Bypass Pump/Acute Normovolemic Hemodilution/ Pre-operative Autologous/Allogeneic blood transfusion
- When feasible check Istat Hb prior to initiation of transfusion and upon completion of transfusion/just prior to patient leaving the operating room
- When patient's condition permits:
  - Cardiopulmonary Bypass Pump blood and Cell Salvage blood must be transfused prior to ANH blood/ pre-operative autologous donated/allogeneic blood
  - ANH blood must be transfused prior to pre-operative autologous donated/allogeneic blood
- Ideally, ANH blood will not be transfused until after major blood loss has ended; may be transfused prior if transfusion trigger indicates (Hb < or = 80; Ischemic ECG changes; trigger specific to patient risk factors – age, CAD); transfusion of ANH blood units will occur in the reverse order from which they were bled (that is, unit #3, #2, #1)
- As patient's condition and final OR Hb result indicate Cell Salvage blood/Cardiopulmonary Bypass Pump blood/ANH blood transfusion may be initiated in the OR or be sent with the patient to PACU/ICU and re-assess the patient's transfusion requirement prior to blood expiry timeframe
- If RBC transfusion equivalent to patient's calculated blood volume has been required, consider possible need for fresh frozen plasma, platelet, cryoprecipitate transfusion
- Unless patient's condition or final Operating Room Istat indicate otherwise, recheck CBC POD # 1
- If CBC rechecked within first 12 hours post-op, consider result in light of patient's fluid status

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# Perioperative Blood Conservation Program

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## Intraoperative Autologous Blood Collection and Transfusion

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### References:

- Standards for Blood Banks and Transfusion Services, 23<sup>rd</sup> edition, American Association of Blood Banks
- Canadian Standards Association Z902-4. Blood and Blood Components, Health Canada
- ASTM Standards for Hospital Transfusion Services, 2004 Canadian Society for Transfusion Medicine
- Standards for Perioperative Autologous Blood Collection and Administration, 1<sup>st</sup> Edition, American Association of Blood Banks
- Guidance for Standards for Perioperative Autologous Blood Collection and Administration, 1<sup>st</sup> Edition, American Association of Blood Banks

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# Perioperative Blood Conservation Program

## Intraoperative Autologous Blood Collection and Transfusion



**London Health  
Sciences Centre**  
  
Clinical Perfusion Services  
**CARDIAC CARE  
CELL SALVAGE RECORD**

|   |  |                |                                 |                |                         |                                 |
|---|--|----------------|---------------------------------|----------------|-------------------------|---------------------------------|
| DATE: _____ (YYYYMMDD)  |  | START: _____   |                                 | FINISH: _____  |                         |                                 |
| SITE: _____   |  | SERVICE: _____ |                                 | SURGEON: _____ |                         |                                 |
| ANESTHESIOLOGIST: _____   |  |                | PERFUSIONIST: _____             |                |                         |                                 |
| <b>PATIENT INFORMATION</b>  |  |                |                                 |                |                         |                                 |
| Age: _____ Sex: <input type="checkbox"/> Female <input type="checkbox"/> Male HL: _____ cm. Wt.: _____ kg Blood Type: _____ |  |                |                                 |                |                         |                                 |
| Patient History: _____  |  |                |                                 |                |                         |                                 |
| Procedure: _____  |  |                |                                 |                |                         |                                 |
| Date of Bloodwork: (YYYYMMDD) _____   |  | Hgb: _____     | Hct: _____                      | PLT: _____     | K: _____ INR/PTT: _____ |                                 |
| <b>COLLECTION DEVICE:</b> Fresenius: _____  |  | Other: _____   |                                 | S/N: _____     |                         |                                 |
| I-STAT Device #: _____  |  |                |                                 |                |                         |                                 |
| <b>ANTICOAGULATION:</b> Heparin: _____ u/L 0.9% NaCl  |  | Other: _____   |                                 |                |                         |                                 |
| <b>TIME</b>   |  |                |                                 |                | <b>TOTALS</b>           | <b>COMMENTS</b>                 |
| Wash Program Selected   |  |                |                                 |                |                         | .....                           |
| Volume: Collected   |  |                |                                 |                |                         | .....                           |
| Volume: Anticoagulant   |  |                |                                 |                |                         | .....                           |
| Est. Volume: Irrigation   |  |                |                                 |                |                         | .....                           |
| Est. Blood Loss to Cell Saver   |  |                |                                 |                |                         | .....                           |
| Volume: Saline Wash   |  |                |                                 |                |                         | .....                           |
| Volume of Processed RBC's Returned To PT  |  |                |                                 |                |                         | .....                           |
| Hct % / K <sup>+</sup> mmol/L of Processed RBC's  |  |                |                                 |                |                         | .....                           |
| EXPIRY DATE / TIME OF PROCESSED RBC's _____   |  |                |                                 |                |                         | NET LOSS FROM CELL SAVER: _____ |
| <b>VISUAL INSPECTION OF PRODUCT:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No                               |  |                | Perfusionist's Signature: _____ |                |                         |                                 |

NS5649 (2006/06/27)

Distribution: WHITE - Chart CANARY - Perfusion Services

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# BLOOD ADMINISTRATION IN THE OPERATING ROOM

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## Review the [Blood Transfusion Resource Manual](#)

### Purpose

- To provide adequate availability of blood products to a patient undergoing surgical intervention.
- To provide safe patient care for the patient receiving blood products.

### Implementation

#### Preoperative

**1. The patient must be admitted to the operating room theatre following the Perioperative Care guidelines “Patient Admission and Identification to the Operating Room Protocol”.**

Correct patient identification is accomplished by cross-checking the patient’s name, Patient Identification Number (PIN) on the Admission and Discharge sheet (face sheet), armband and addressograph plate.

**2. It is the responsibility of the circulating nurse to check that blood product(s) will be available should they be required, prior to the start of the procedure by:**

- a. Determining whether there is an order for Group and Reserve/Crossmatch
- b. If there is an order, determining whether there is an indate Blood Transfusion Lab (BTL) specimen.
  - i. Check either the PowerChart report in the patient’s paper chart, or on-line look under the Blood Product Information tab in SurgiNet or PowerChart. (OR Nurse should not launch Periop Doc tab until patient has entered OR theatre)
- c. If specimen is outdated or a specimen is required but was not drawn, a new specimen must be sent to the BTL preferably before the patient is admitted to the OR, and if not possible, a sample must be drawn promptly (by anesthesiologist) and sent after the patient enters the OR theatre, prior to induction.

**3. The BTL will crossmatch units when the blood is required in the OR.**

#### Intraoperative

1. When blood product(s) are requested, a call may be made to Blood Transfusion Laboratory by the circulating nurse, anaesthesiologist, surgeon and/or perfusionist to request the blood product(s). The Blood Transfusion Laboratory will ask for the following information: the patient’s name, PIN number as well as specific blood product(s) required and the amount (i.e. number of units).

2. When blood product(s) are requested, the Issue Voucher for Blood Products (#8460-4950), indicating the type and the desired amount of blood product(s) is completed. The Issue Voucher for Blood Products is brought to the Blood Transfusion Laboratory by the Patient Service

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# BLOOD ADMINISTRATION IN THE OPERATING ROOM

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Attendant (PSA). Blood may be requested for immediate use, in which case, it will be transported without a cooler and must be administered immediately. Blood may be requested for transport in a cooler for use within 6 hours. The Issue Voucher for Blood Products must be signed by the circulating nurse, anaesthesiologists and/or perfusionist, if requesting a cooler. It is then the responsibility of the person signing the Issue Voucher for Blood Products to ensure that the cooler remains closed except for the removal of blood products as required, AND that the cooler is returned to the Blood Transfusion Laboratory when the procedure is complete or within the 6 hour time limit, whichever comes first.

3. The PSA will participate with the Blood Transfusion Laboratory Technologist in confirming that the patient's name and PIN on the Issue Voucher for Blood Products is identical to the patient's name and PIN on the blood product(s). Any discrepancies will be resolved prior to leaving the Blood Transfusion Lab.

4. The PSA and Blood Transfusion Laboratory Technologist will ensure blood product(s) requested are appropriately packed into cooler, if requested.

5. The blood product(s) will be taken to the operating room, in a cooler if requested, and the circulating nurse will be notified of its arrival.

6. NOTE: Platelets MUST NOT be placed in cooler. Platelet survival depends on platelets being maintained at 20°C to 24°C. Platelets must be issued just prior to administration.

## Administration of Blood Product(s)

1. Administration of Blood Products Immediately Upon Arrival to the OR Theatre
  - a. Follow the "Guidelines for Charting and Administration of Blood Products" in the [Blood Transfusion Resource Manual](#). The Admission and Discharge sheet, together with the blood product(s) label(s), will be cross-checked to ensure accuracy of information and correct patient identification. The patient's armband is used in the process, if available (often not available due to draping).
  - b. Check the patient's ABO and Rh group documented on the blood product label(s) to ensure a match.
  - c. Inspect the blood product(s) for abnormal appearance.
  - d. Record the date, time and name of the two people performing the check on the blood product label(s).
  - e. Apply the blood product label(s) to a Laboratory requisition on the patient's chart when the infusion begins.

**NOTE:** If the individual administering the blood product(s) is not one of the two individuals who has checked and signed the blood product label(s), another check must be done by that individual to ensure correct patient identification (see "a" above).

# BLOOD ADMINISTRATION IN THE OPERATING ROOM

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## 2. Checking and Administration of Blood Product(s) from a Cooler

The following procedure must be followed when blood product(s) are checked upon arrival to the OR theatre but are not administered immediately.

- a. Follow the “Guidelines for Charting and Administration of Blood Products” in the [Blood Transfusion Resource Manual](#). The Admission and Discharge sheet, together with the blood product(s) label(s), will be cross-checked to ensure accuracy of information and correct patient identification. The patient’s armband is used in the process, if available (often not available due to draping).
- b. Check the patient’s ABO and Rh group documented on the blood product label(s) to ensure a match
- c. Inspect the blood product(s) for abnormal appearance.
- d. Record the date, time and name of the two people performing the check on the blood product label(s). Place the blood product(s) label(s) back on the blood product(s), ensuring unit number on label(s) matches unit number on blood product(s) and return the blood product(s) to the cooler. Cooler must be closed to maintain appropriate temperature.
- e. When blood product(s) are required, remove from the cooler, check label(s) and if previously initialled by 2 individuals, a confirmation of patient identification (see “a” above) MUST be done by the person that is administering the blood product(s). If the product label(s) have NOT been checked, “a” to “d” above must be followed before administering the blood product(s). Apply the blood product label(s) to a Laboratory requisition on the patient’s chart when the infusion begins.