|  |  |  |  |
| --- | --- | --- | --- |
|  | **Crossmatch Procedures** BB.R.1007.5 | **Dept:**  | 324311 |
| **Dept Name** | Blood Bank |
| **Effective Date:** | Title 21  |
| **Revised Date:** | Title 21 |
| **Name & Title**: CLIA Laboratory Medical Director | **Contact:** | Julie Simmons/Christina Warren |
| **Signature:** | Refer to Title 21 | **Date:** | **Title 21** |

**1. General Procedure Statement:**

1. **Purpose:** The crossmatch must detect ABO incompatibility either serologically or electronically. The crossmatch shall include an antiglobulin test in the presence of a current or historical clinically significant antibody to detect clinically significant antibodies to red cell antigens.
2. **Responsible Department/Scope:**

 Procedure owner/Implementer: Julie H. Simmons/Christina Warren

 Procedure prepared by: Julie H. Simmons

 Who performs procedure: Department staff/management

1. **Definitions:**

AHG: Anti human globulin

IS XM: Immediate spin Crossmatch

XME: Crossmatch Electronic: Computer checks for ABO compatibility

 XM: Crossmatch

 AHG XM: Anti human globulin crossmatch

* PEG (Polyethylene Glycol): Crossmatch testing media
* Gel: Crossmatch testing media
* LISS (Low Ionic Strength Solution): Crossmatch testing media
* SP (Solid Phase): Crossmatch testing media (NEO/ECHO)

 FULL XM: IS crossmatch AND antiglobulin crossmatch

* For gel testing, immediate spin + IgG phase.
* For PEG testing, immediate spin + 37C check for hemolysis + IgG phase
* For LISS testing, immediate spin + 37C + IgG phases
* For Saline testing, immediate spin + 37C + IgG phases
* For Solid Phase testing, immediate spin + IgG phase

DAT: Direct Antiglobulin Test

 IgG: Immunoglobulin G: Potentially clinically significant antibodies

 IgM: Immunoglobulin M

 SCC: Soft Computer Consultants, Blood Bank computer system

 Requisition: WakeOne requisition or order form or equivalent

 PCW: SCC Patient Caution Window

 DMC BR: Davie Medical Center at Bermuda Run

 Microtube: Gel column

1. **Sections:**
2. Immediate Spin (IS) Tube Crossmatch Testing
3. Gel Immediate Spin Crossmatch Testing (IS)
4. Indirect Antiglobulin Phase (AHG) Tube Testing
5. Gel Crossmatch Testing (AHG)
6. Delayed Crossmatch Testing for Surgeries at WFBMC and DMC BR
7. Entering Crossmatch Results in SCC

A. Joint Worksheet

B. Crossmatch Worksheet

C. How to Change a Crossmatch Test in SCC Once Ordered

1. Electronic Crossmatch
2. Ordering and Resulting the XM test Performed on Ortho Vision Max
3. Confirmed Transfused Report
4. Deglycerolizing Frozen Segment
5. Protocol

*Refer to Protocols: Crossmatch Protocols*

**2. Procedure:**

Chemical Risk Assessment: None

Biological Risk Assessment: Low

Protective Equipment: Lab coat, gloves

Supplies: 10x75 tubes, pipets

Reagents: Screening Cells

Equipment: Centrifuge

Specimen Requirements:

Plasma: Anti-coagulated specimen (CPDA-1, CPD, ACD or EDTA)

 Serum: Clotted

**I. Procedure: Immediate Spin (IS) Tube Crossmatch Testing**

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Compare patient identification and required patient information on Blood Bank requisition, blood specimen and Blood Bank LIS before proceeding to test.***Refer to: BB.Protocol: Comparing Patient Identification Prior to Testing* |  |
| **2.0** | **Label (1)one 12x75 or 10x75mm tube for each unit to be crossmatched with a minimum of first 3 initials of the patient’s last name and the unit number.***Refer to: BB.Protocol: Blood Bank Work Organization, Section 3* |  |
| **3.0** | **Add two drops of patient serum/plasma to each tube labeled in step 2 using Blood Bank plastic transfer pipets.** |  |
| **4.0** | **Prepare a 2-5 % unit cell suspension from the attached unit segment.**4.1 Place one (1) drop of cells into a tube labeled with the unit number.4.2 Add enough 0.9% saline to produce a red color comparable to that of commercially  prepared reagent cells. |  |
| **5.0** | **Add one drop of the 2-5 % unit cell suspension to each patient test tube using the Blood Bank plastic transfer pipet.**  |  |
| **6.0** | **Mix well and centrifuge the tubes for the IS time indicated on centrifuge. Examine for hemolysis.** |  |
| **7.0** | **Resuspend cell button carefully reading macroscopically for agglutination using agglutination lamp.** |  |
| **8.0** | **Grade and enter test reactions in computer system or during downtime record test results immediately on BB requisition or equivalent.***Refer to Routine: Grading of Positive and Negative Reactions.**Refer to Procedure VI: Entering Crossmatch Results in SCC.* |  |
| **9.0** | **Interpret results***Refer to Attachment 1: Interpretation of Results.**Refer to Attachment 2: Limitations of Crossmatch Methods* |  |

**II: Gel Immediate Spin Crossmatch Testing (IS)**

Chemical Risk Assessment: None

Biological Risk Assessment: Low

Protective Equipment: Lab coat, gloves

Supplies: 10x75 tubes, pipets, Neutral Buffered Gel card, Pipets: 25 µl, 50 µl, 10 µl, MTS Diluent 2

Reagents: 0.8% Donor red cell suspension

Equipment: Ortho Workstation

Specimen Requirements:

Plasma: Anti-coagulated specimen (CPDA-1, CPD, ACD or EDTA)

Serum: Must be completely clotted

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Compare patient identification and required patient information on Blood Bank requisition, blood specimen and Blood Bank LIS before proceeding to test.***Refer to: BB.Protocol: Comparing Patient Identification Prior to Testing* |  |
| **2.0** | **Review SCC patient caution window (PCW) to assist in determining method to use.** 2.1 The following computer codes are used to indicate the preferred crossmatch Method for testing patient: Do gel Do LISS Do PEG Do SP 2.2 If no specific method is indicated, then SP/PEG is the current default method.  |  |
| **3.0** | **Inspect the Neutral Gel Card to make sure foil is intact and card has not dried out.**3.1 Make sure there are no liquid bubbles in the upper chamber. a. If there are liquid bubbles in the upper chamber, then centrifuge the card in  the DG spin before using.  |  |
| **4.0** | **Label the Neutral Gel Card with appropriate patient and donor information.***Refer to: BB.Protocol: Blood Bank Work Organization, Section 3* |  |
| **5.0** | **Remove foil seal from the card (leave unused wells covered).** |  |
| **6.0** | **Prepare 0.8% suspension of donor cells:**6.1 Label 12x75mm or 10x75mm test tube(s) for each donor to be crossmatched  with donor unit label or last 6 numbers of donor unit. 6.2 Dispense 1.0mL of MTS Diluent 2 to tube(s). *Refer to: BB.Policy: Blood Bank Work Organization, Section 3*6.3 Remove segment from unit and add 10µl of packed red blood cells from each  segment in the corresponding labeled tube.6.4 Mix well. Final suspension should be approximately 0.8%. |  |
| **7.0** | **Add 50µl of each 0.8% donor red blood cell unit suspension to the corresponding microtube using an appropriate MLA pipette ensuring there is an air gap in the microtube.**Air Gap No Air Gap7.1 The test must be repeated if the air gap is not present.  |  |
| **8.0** | **Add 50µl patient plasma/serum to each microtube using an appropriate MLA pipette.**  |  |
| **9.0** | **Place in Ortho Workstation centrifuge.** |  |
| **10.0** | **Centrifuge the gel card at the preset conditions (10 minutes) of the manufacturer.** |  |
| **11.0** | **Read each microtube macroscopically.** 11.1 Read front of card by holding up to light or against a white background. |  |
| **12.0** | **Enter reactions into computer or during downtime record reactions on BB requisition or equivalent immediately.***12.1 Refer to Routine: Grading of Positive and Negative Reactions, III Gel Method*12.2 Refer to Section VI: Entering Crossmatch Results in SCC12.3 Cards are stable for 24 hours if parafilmed and placed at 1-6C.  |  |
| **13.0** | **Interpret results***Refer to Attachment 1: Interpretation of Results.**Refer to Attachment 2: Limitations of Crossmatch Methods* |  |

**III: Indirect Antiglobulin Phase (AHG) Tube Testing**

Chemical Risk Assessment: None

Biological Risk Assessment: Low

Protective Equipment: Lab coat, gloves

Supplies: 10x75 tubes, pipets

Reagents: Screening Cells, Antiglobulin, Coombs Control Cells, LISS or PEG

Equipment: Centrifuge, Incubator, Cell washer

Specimen Requirements:

Plasma: Anti-coagulated specimen (CPDA-1, CPD, ACD or EDTA)

 Serum: Clotted

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Compare patient identification and required patient information on BB requisition, blood specimen and Blood Bank LIS before proceeding to test.***Refer to: BB.Protocol: Comparing Patient Identification Prior to Testing* |  |
| **2.0** | **Review patient’s SCC PCW computer record to assist in determining method to use.** 2.1 The following computer codes are used to indicate the preferred crossmatch Method for testing patient: Do gel Do LISS Do PEG Do SP 2.2 If no specific method is indicated, then SP/PEG is the current default method. 2.3 Select the method and follow specific instructions for that method.

|  |  |
| --- | --- |
| **Method** | **Do** |
| **LISS** | a. Add two drops of potentiating medium LISS to each tube.b. Mix wellc. Incubate at 37°C ± 2°C for 15 to 30 minutes.d. Remove tubes from incubatore. Centrifuge for the calibrated time (IS calibrated time). f. Examine supernatant for hemolysis. g. Resuspend each cell button gently. h. Grade agglutination macroscopically using agglutination viewer. i. Record results – any hemolysis and/or agglutination.*Refer to Section V: Entering Crossmatch Results in SCC* |
| **PEG** | a. Add two drops of potentiating medium PEG to each tube.b. Mix wellc. Incubate at 37°C ± 2°C for 15 to 30 minutes.d. Do NOT centrifuge after removing from incubator.e. Examine for hemolysis (if present, may indicate ab/ag reaction). f. Record results- any hemolysis and/or agglutination.*Refer to Section V: Entering Crossmatch Results in SCC.* |
| **Saline** | a. Incubate at 37°C ± 2°C for 30 to 60 minutes.b. Remove tubes from incubatorc. Centrifuge for the calibrated time (IS calibrated time). d. Examine supernatant for hemolysis. e. Resuspend each cell button gently. f. Grade agglutination macroscopically using agglutination viewer. g. Record results – any hemolysis and/or agglutination*Refer to Section V: Entering Crossmatch Results in SCC.* |
| **Solid Phase**  | 1. Refer to ECHO and NEO manuals for testing
2. Refer to Section for specifics on running the crossmatch on the instruments.
3. EXIT procedure.
 |

 |  |
| **3.0** | **Wash the tubes 3-4 times with 0.9% saline or equivalent.** *Refer to Equipment Operations: Centrifuge Operation, VII Cell Washing Manual and Automated.*  |  |
| **4.0** | **Add 2 drops of anti-IgG to dry cell button.**4.1 There may be a need to use polyspecific antiglobulin reagents instead of  anti-IgG. In these cases, the instructions will be in the patient caution window.  |  |
| **5.0** | **Mix and centrifuge for the calibrated time posted on the centrifuge.** |  |
| **6.0** | **Resuspend and read macroscopically for agglutination using agglutination viewer.** 6.1 If serological reactions are suspicious, read test microscopically by placing  tube on tube reader under microscope.  |  |
| **7.0** | **Grade and enter results immediately in BB computer system or during downtime record on BB requisition or equivalent.**7.1 *Refer to Routine: Grading of Positive and Negative Reactions, I. Grading Tube Testing*  *Methods (LISS, PEG, Enzyme, Saline).* |  |
| **8.0** | **Add one (1) drop of 2-5% IgG-sensitized control cells to all negative tests. Repeat steps 5 to 7 (macroscopic reading only).**

|  |  |  |
| --- | --- | --- |
| **Interpretation** | **Result** | **Additional Direction** |
| INVALID | Weak agglutination or none.(1+ or weaker) | Repeat the test. |
| VALID | Agglutination (2+ or greater) | Report the result.  |

8.1 Interpret IgG sensitized control cells.  |  |
| **9.0** | **Grade and enter test reactions in computer system or during downtime record test results immediately on BB requisition or equivalent.***Refer to Routine: Grading of Positive and Negative Reactions.**Refer to Procedure VI: Entering Crossmatch Results in SCC.* |  |
| **10.0** | **Interpret results***Refer to Attachment 1: Interpretation of Results.**Refer to Attachment 2: Limitations of Crossmatch Methods* |  |

**IV: Gel Crossmatch Testing (AHG)**

Chemical Risk Assessment: None

Biological Risk Assessment: Low

Protective Equipment: Lab coat, gloves

Supplies: 10x75 tubes, pipets, Anti-IgG card, Pipets: 25 µl, 50 µl, 10 µl, MTS Diluent 2

Reagents: 0.8% Screening Cells

Equipment: Ortho Workstation

Specimen Requirements:

Plasma: Anti-coagulated specimen (CPDA-1, CPD, ACD or EDTA)

Serum: Sample must be clotted completely.

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Compare patient identification and required patient information on Blood Bank requisition, blood specimen and Blood Bank LIS before proceeding to test.***Refer to: BB.Protocol: Comparing Patient Identification Prior to Testing* |  |
| **2.0** | **Review SCC patient caution window (PCW) to assist in determining method to use.** 2.1 The following computer codes are used to indicate the preferred crossmatch Method for testing patient: Do gel Do LISS Do PEG Do SP 2.2 If no specific method is indicated, then gel is the current default method.  |  |
| **3.0** | **Perform Immediate spin crossmatch with the Gel Crossmatch Testing Procedure.** *Refer to Section I. Immediate Spin (IS) Tube Testing or Section II. Immediate Spin Gel Testing.**Refer to Section V for Entering Crossmatch Results Reporting.*  |  |
| **4.0** | **Inspect the Anti-IgG Card to make sure foil is intact and card has not dried out.**4.1 Make sure there are no liquid bubbles in the upper chamber. a. If there are liquid bubbles in the upper chamber, then centrifuge the card in the  Ortho Workstation centrifuge. |  |
| **5.0** | **Label the Anti-IgG Card with appropriate patient and donor information.***Refer to: BB.Protocol: Blood Bank Work Organization, Section 3* |  |
| **6.0** | **Remove foil seal from the card (leave unused wells covered).** |  |
| **7.0** | **Prepare 0.8% suspension of donor cells if not using the 0.8% prepared for the Immediate Spin Neutral Gel Crossmatch:**7.1 Label 12x75mm or 10x75mm test tube(s) for each donor to be crossmatched with unit  label or last 6 donor unit numbers. 7.2 Dispense 1.0mL of MTS Diluent 2 to tube(s). *Refer to: BB.Policy: Blood Bank Work Organization, Section 3*7.3 Remove segment from unit and add 10µl of packed red blood cells from each  segment in the corresponding labeled tube.7.4 Mix well. Final suspension should be approximately 1.0%. |  |
| **8.0** | **Add 50µl of each 1.0% donor red blood cell unit suspension to the corresponding microtube using an appropriate MLA pipette ensuring there is an air gap in the microtube.** **Air gap No Air Gap**8.1 The test must be repeated if the air gap is not present. |  |
| **9.0** | **Add 25µl patient plasma/serum to each microtube using an appropriate MLA pipette and place in Digi Therm.**  |  |
| **10.0** | **Incubate at 37°C** ± 2°C **for 15 to 40 min.**10.1 Incubation is normally 15 minutes, but may be extended up to 40 min. |  |
| **11.0** | **Centrifuge the gel card at the preset conditions (10 minutes) of the manufacturer in Ortho Workstation centrifuge (balanced).** |  |
| **12.0** | **Read front/back of each microtube macroscopically by holding up to light or against a white background.**  |  |
| **13.0** | **Enter reactions into SCC computer or during downtime record reactions on BB requisition or equivalent immediately.**13.1 *Refer to Routine: Grading of Positive and Negative Reactions*13.2 *Refer to Section VI: Entering Crossmatch Results in SCC*13.3 Cards may be viewed for up to one week if properly sealed with tape.  |  |
| **14.0** | **Interpret results***Refer to Attachment 1: Interpretation of Results.**Refer to Attachment 2: Limitations of Crossmatch Methods* |  |

**V: Delayed Crossmatch Testing for Surgeries at WFBMC and DMC BR**

Chemical Risk Assessment: None

Biological Risk Assessment: None

Protective Equipment: Lab coat, gloves

Supplies: Request for Delayed Crossmatch form, Refer to Sections I, II, III for additional supplies

Reagents: Refer to Sections I, II, III

Equipment: Refer to Sections I, II, III

Specimen Requirements: Refer to Sections I, II, III

**Criteria for Delayed Crossmatch:**

* Patients must not be pregnant or transfused within the past 3 months.
* Patients tested on preassessment that have a positive antibody, transfused / pregnant

within 3 months, request form not complete, do not qualify for Delay Crossmatch

* Patients can be scheduled for surgery up to and including 30 days before surgery/transfusion.
* When patients do not appear to have gone to surgery because the yellow copy for the delayed crossmatch is not returned.
	+ Store blood specimen in rotating 14 day rack
	+ Store paperwork in bins for Expired Requisitions under date collected

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Review the Request for Delayed Crossmatch form (pink copy) for pre surgery criteria for delayed crossmatch and signature of patient, reviewer and phlebotomist when specimen is received from preoperative clinic. BBID must also be present.** 1.1 Form must be complete. a. Call the PAC clinic (63245) for surgeries scheduled for Main Campus or DMC Lab for  surgeries scheduled at DMC BR. b. If the form is incomplete or if the patient is disqualified due to antibody(ies),  document on the delayed crossmatch paperwork, the first and last name of person notified and the date and time notified.* 1. Perform prior record check to search for transfusions or obstetric orders such as

OBX within the preceding three months.   |  |
| **2.0**  | **Blood Bank will complete Type/Screen testing.**2.1 For positive screens, identify the antibody (ies) and arrange to get antigen negative blood  available for day of surgery.2.2 Place sample in Delayed Crossmatch rack in Sera 3 in row for intended day of surgery for  crossmatch to be performed.  *Refer to Routine: ABO/Rh Testing* *Refer to Routine: Antibody Screen/Indirect Antiglobulin Test* *Refer to Protocols: Crossmatch Protocols* |  |
| **3.0** | Interpret the criteria for delayed crossmatch for DMC BR and/or WFBMC.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Criteria** | **Form** | **Pregnancy (Females only)** | **Transfusion** | **Clinically significant antibody (past or present)** | **Further Action Indicated** |
| **Acceptable** | Complete | None within past 3 months | None within past 3 months | No | Continue if meets acceptable criteria. |
| **Unacceptable** | Incomplete | Unknown or within past 3 months | Unknown or within past 3 months | Yes, Discuss with management.  Order antigen negative units. | Inform the pre-op clinic (if patient is in the pre-op clinic) or DMC BR Lab if criteria unacceptable and/or specimen is unacceptable. Record name of person called with date/time. If Patient in Holding or OR, inform the physician when criteria unacceptable and/or specimen is unacceptable. Staple the Delayed form to the back of the BB requisition form.Exit this procedure. |

 |  |
| **4.0** | **Determine where surgery was scheduled.**

|  |  |
| --- | --- |
| **If Surgery Was Scheduled for** | **Then** |
| WFBMC (Main Campus) | 1. Put on calendar as delayed and change color to gray to document status of sample
 |
| DMC Bermuda Run | 1. Put on calendar for next week in gold.
2. Note that patient has antibodies and to check for surgery reschedule date at Main Campus.
3. Document on calendar to obtain antigen negative units for surgery.
 |

 *Refer to attachment 3: Crossmatch Flowchart* *Refer to attachment 4: Delayed Crossmatch Process for Surgeries at DMC and WFBMC* |  |
| **5.0** | **EXTEND expiration date of the specimen to intended day of surgery if the specimen is acceptable and enter information about delayed surgery in computer.**

|  |  |
| --- | --- |
| **Modify Expiration Date** | **Enter Delayed Special Message** |
| 1. Go to Patient>Orders>Modify.
 | 1. Go to Patient>Edit>Messages. |
| 1. Enter Patient’s MRN. F12 to accept.
 | 2. Enter Patient’s MRN. F12 to accept.  |
| 1. Select correct admission date.
 | 3. Select correct admission date. |
| 1. Review patient history and Esc-Quit.
 | 4. Review patient’s history and Esc-Quit.  |
| 1. Enter F12 to bring up order number and select correct order number if multiple.
 | 5. Select Add new special message. Select “Delay” from drop down box.  |
| 1. Modify the Outdate of specimen. F12 to accept.
 | 6. Type in comment: ‘Delayed XM for mmddyy, received mmddyy’ ‘Surgery scheduled for DMC or WFBMC’ F12 to accept and Yes to save.  |

 |  |
| **6.0** | **File the request form in the Delayed file section of the box behind the date of intended surgery.****6.1 Place a DMC Surgery Flag and put in front of acetate if surgery is scheduled for DMC BR.** |  |
| **7.0** | **Flag “delayed crossmatch” on BB Monitor 1.**

|  |  |
| --- | --- |
| **Surgery Will be at** | **Enter on BB Monitor 1** |
| **WFBMC** | Put Information in “**RED**” ***for Day of Surgery***:a. Patient Nameb. Medical Record Number |
| **DMC BR** | Put Information in “**GOLD**” ***for day prior to Date of Surgery***:a. Patient Nameb. Medical Record Numberc. Surgery at DMC tomorrowd. Send cooler with blood today before 4pmPut Information in “**GOLD**” ***for day of Surgery***:a. Patient Nameb. Medical Record Numberc. Surgery at DMC  |

 |  |
| **8.0** | **On day before surgery:** 8.1 Pull the request forms from the Delayed file section for surgeries scheduled the  following day. 8.2 Repeat the history check. 8.3 History and Pregnancy check on Day Before Day of Need

|  |  |
| --- | --- |
| **IF** | **DO** |
| Transfused with blood products or pregnant within previous 3 months | 1. Check the Delayed Crossmatch form for physician and notify that a new specimen must be collected prior to surgery.
 |
| Not transfused or pregnant within previous 3 months | 1. Locate the blood specimen
2. Proceed to Step 9.
 |

8.4 Some patients from DMC BR with antibodies will be provided antigen blood. Make certain  there are at least two units of antigen negative blood reserved for patients to be sent on day of surgery early after new blood specimen is received and crossmatched with units of  blood. 8.5 For pre admission blood specimen missing or not located: a) proceed to make blood units (if needed) available by electronic crossmatch only if the  patient qualifies for delayed crossmatch. b) On day of surgery, request with same BBID#.  c) Document new blood specimen in SCC using test code EXTRA (pending).??? No testing is required. |  |
| **9.0** | **Pull Delayed Crossmatches.**

|  |  |
| --- | --- |
| **Surgery Will be at** | **DO** |
| **WFBMC** | 1. In early AM on day of surgery
 |
| **DMC BR** |

|  |  |
| --- | --- |
| Patients that qualify | 1. In early AM day **BEFORE** surgery.
2. Perform crossmatches and enter in SCC.
3. Place Safe-T-Vues on units being sent
4. TRANSFER units to DMC BR in SCC
5. Pack units up in 5 day cooler.
6. Call DOT courier to deliver to DMC BR Lab. (Should be delivered prior to 4pm the day BEFORE surgery.)
7. Change calendar posting to green
 |
| Patients that Do Not qualify due to antibodies, etc.  | 1. Arrange for new blood specimen to be drawn early on patient within 72 hours of surgery.
2. Provide antigen negative blood at least two units or number specificed.
3. Perform crossmatches and enter in SCC.
4. Place Safe-T-Vues on units being sent
5. TRANSFER units to DMC BR in SCC
6. Pack units up in 5 day cooler.
7. Call DOT courier to deliver to DMC BR Lab. (Should be delivered prior to 4pm the day BEFORE surgery.)
8. Change calendar posting to green
 |

  |

 |  |
| **10.0** | **For surgeries at WFBMC, review the Request for Delayed Crossmatch form (yellow copy or faxed copy) for day of surgery criteria for delayed crossmatch and signature of patient and reviewer when it is received from holding room/OR/or BBFront.*** 1. Call the holding room or OR if the form is incomplete.
	2. Perform Step#3 prior record check to search for transfusions or obstetric orders such

 as OBX within the preceding three months. |  |

**VI: Entering Crossmatch Results in SCC**

Chemical Risk Assessment: None

Biological Risk Assessment: None

Protective Equipment: Lab coat, gloves

1. Joint Worksheet (Adding units to TSX in progress)

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Go to Results>Joint Worksheet.*** 1. Select Build and TSXM worksheet.
	2. Answer Yes to Add tests.
	3. Select tests. F12 to accept.
	4. Select correct Rack that has been QC’d from drop down list.
	5. Add units to order.
	6. Highlight patient
	7. Click CTRL + U
	8. Verify correct patient. Esc-Quit.
	9. Choose Select to select units to patient.

a. Scan unit(s) and product code if needed. b. F12 to accept list and Yes to accept.c. Answer YES to rebuild worksheet.d. Click Quit to return to worksheet.* 1. Unit is now list with patient testing.
	2. Enter results.
	3. NOTE: Enter results individually by going to Patient>Orders>Results.
 |  |

1. **Crossmatch Worksheet (Adding units after TSX has been completed)**

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Select red cell to patient.*** 1. Go to Inventory>Product Order Service>Select.
	2. Enter Patient’s MRN number and F12 to accept.
	3. Select correct admission date if multiple.
	4. Review patient caution window: Esc-Quit.
	5. Click F12 at Patient Product Order number.
	6. Select red cell order and enter select.
	7. Scan unit number and product code.
1. Warning will appear:
* if patient does not qualify for electronic crossmatch.
* if auto/directed units are available.
* if irradiation is required and selected unit is not irradiated.
1. Answer warning as appropriate. Yes to continue or No to not continue.
	1. Scan any additional units and read any warnings that appear.
	2. F12 to accept unit list and yes to accept.
2. Read any exceptions that occur and comment appropriately, F12 to accept.

*Refer to Attachment 3 : Crossmatch Units flowchart* |  |
| **2.0** | **Go to Results>Crossmatch Worksheet.**2.1 Build Crossmatch Worksheet. 2.2 Select XMATC worksheet. Enter Workstation and Default rack# if needed.2.3 F12 to accept. |  |

1. **How to Change a Crossmatch Test in SCC Once Ordered**

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Change the crossmatch method.**

|  |  |
| --- | --- |
| **Unit NOT Selected** | **Unit HAS BEEN Selected** |
| 1. Go to Patient>Orders>Modify
2. Modify the XM test
 | 1. Go Patient>Orders>Xmatch
2. Add the XM needed to the unit/original red cell order
3. Result the crossmatch
4. Cancel the original XM in Patient>Orders>Cancel.
5. If you do NOT cancel the original crossmatch, you will get a message at issue that XM is pending.

 **Do NOT Release the unit** **Do NOT order another RC in**  **Patient>Orders>Modify.** |

 |  |

 **VII. Electronic Crossmatch**

**VIII. Ordering and Resulting the Crossmatch Test Performed on ECHO/NEO**

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Go to Patient>Orders>Modify.*** 1. Enter Patient’s MRN and F12 to accept.
	2. Verify correct patient and Esc-Quit out of view.
	3. F12 to accept the most current order number or enter order number if multiple.
	4. Change the Xmatch to XMSP for Crossmatch Solid Phase.
1. If the crossmatch is not changed to Solid Phase, it will not download.
	1. F12 to accept.
	2. Proceed to Step 2 to select unit to patient.
 |  |
| **2.0** | **Select red cell to patient.*** 1. Go to Inventory>Product Order Service>Select.
	2. Enter Patient’s MRN number and F12 to accept.
	3. Select correct admission date if multiple.
	4. Review patient problem box: Esc-Quit.
	5. Click F12 at Patient Product Order number.
	6. Select red cell order and enter select.
	7. Scan unit number and product code.
1. Warning will appear:
* if patient does not qualify for electronic crossmatch.
* if auto/directed units are available.
* if irradiation is required and selected unit is not irradiated.
1. Answer warning as appropriate. Yes to continue or No to not continue.
	1. Scan any additional units and read any warnings that appear.
	2. F12 to accept unit list and yes to accept.
2. Read any exceptions that occur and comment appropriately, F12 to accept.

*Refer to Attachment 3 : Crossmatch Units flowchart* |  |
| **3.0** | **Load patient sample in specimen rack and donor samples (contents of 2 segments in tube with bar code label) into Donor rack.**3.1 Load patient and donor samples on instrument.

|  |  |
| --- | --- |
| **ECHO** | **NEO** |
| 1. Load patient specimen in specimen rack and donor samples in donor rack.
2. Load both racks on ECHO.
3. Worklist message should appear at bottom of screen. If it doesn’t click the work list and click refresh.
4. Select the appropriate tests that are being run.
5. Click Next.
6. Load appropriate strips or reagents.
7. Click Begin Tests.
8. Load strips. (Refer to ECHO manual if needed.)
 | 1. Go to Load Samples
2. 14 bay appears
3. Load patient rack onto sample loading bay row with green light.
4. Wait till next green light appears and load donor rack in sample loading bay row with green light.
5. Click done.
6. Click download requests.
7. Tests will be pulled from interface.
8. Press load reagents and proceed to test as usual. (Refer to NEO manual if needed).
 |

 |  |
| **4.0** | **Export results.**4.1 Go to Results>Test Verify to complete the tests in SCC.4.2 The following tests are built to repeat if there is a need to repeat the initial test that  is run on the instruments:1. ABOR
2. RHR
3. ABSPR
4. WEAKDR
5. DATSR
6. XMSPR

4.3 Change the status of the questionable result to “Repeat” instead of completed.4.4 Go to Patient>Orders>Modify and enter MRN of patient as in steps 1.1 to 1.6.4.5 Add the repeat test from the drop down box. For Group – you must chooses both ABOR and RHR.**NOTE: To repeat the crossmatch on the instrument, you must add an additional line of RC with the XMSPR as the test. It will not download if you simply try to change the current type of crossmatch.****You must also release and then re-select the unit to the XMSPR test. It will not download if you select it to the original XMSP test.**  |  |

**IX. Confirmed Transfused Report**





**2. Procedure: X. Deglycerolizing Frozen Segment**

 Chemical Risk Assessment: None

 Biological Risk Assessment: Moderate

 Protective Equipment: Lab coat, gloves

 **Supplies:** 12x75 glass tubes, scissors

 **Reagents:** 500mL container 0.9% saline, 150mL container 12% saline, deionized water

 **Equipment:** Serofuge centrifuge

 **Specimen Requirements**: n/a

*\*Note: Check Sera #3 to see if 8.5% saline is already prepared. If not, see Deglycerolization procedure Section VIII:*

 *Preparation of Saline Solutions.*

| **STEPS** | **INSTRUCTIONS** | **CHANGE/****APPROVAL** |
| --- | --- | --- |
| **1.0** | **Select red cell unit(s) using computer function Inventory>Display.** |  |
| **2.0** | **Remove segment from the freezing canister.** *Caution: Make sure canister is closed securely while removing segment from the end (with binder clip or manually).***Protective Equipment: Cryo Gloves** |  |
| **3.0** | **Verify that the antigen type on the tag is the same as in the computer.****Protective Equipment: Cryo Gloves** |  |
| **4.0** | **Thaw segment at room temperature or in 37°C drybath.** |  |
| **5.0** | **Cut and transfer contents of segment (or use Hemotype segment cutter) to a labeled 12 x 75 tube.** |  |
| **6.0** | **Add an equal volume of 8.5% saline.**  6.1 Cap, mix well, and allow to equilibrate for approximately one minute. |  |
| **7.0** | **Wash red cells at least twice with large volumes of 0.9% saline *until the supernatant is clear. Additional washes may be necessary.*** |  |
| **8.0** | **Resuspend washed red cells to 2-4% concentration for testing.** 8.1 Suspension may be stored at 1-6°C. Do not use after 12 hours. 8.2 Gel testing requires 0.8% suspension *(*Refer to *Routine Procedure*  *Manual:Crossmatch* BB.R.1007). |   |

**3. Review/Revised/implemented:**

 All procedures must be reviewed as stated in the Document Control Protocol.

 All new procedures and procedures that have major revisions must be signed by the CLIA Director.

 All reviewed procedures and procedures with minor revisions can be signed by the designated section medical

 director or designee.

**4. Related Procedures:**

Routine: Grading Positive and Negative Reactions

 Protocol: Crossmatch Protocols

**5. References**:

 References: Technical Manual, revised periodically.

**6. Attachments**:

 Attachment 1: Interpretation of Test Results

 Attachment 2: Limitations of Crossmatch Methods

 Attachment 3: Crossmatch Flowchart

 Attachment 4: Delayed Crossmatch Process for Surgeries at DMC and WFBMC

**7. Revised/Reviewed Dates and Signatures:**

 See Archived Document Change Control

**Attachment 1: Interpretation of Test Results**

|  |  |  |
| --- | --- | --- |
| **Observation** | **Interpretation** | **Comments** |
| **Hemolysis or Agglutination in any phase** | **Incompatible** | This may indicate the presence of a serologically incompatible crossmatch.Further investigation is required:* Immediately check for ABO incompatibility.
* Refer to antibody identification procedures.

Incompatible crossmatches with a negative antibody screen may be due to:* The transfusion of out of group platelets, transfusion with group O red cell is required as long as the patient is demonstrating anti-A or anti-B.
* A low frequency antibody.
* The donor unit has a positive DAT(unit with a positive DAT must be returned to the supplier).
 |
| **ABSENCE of agglutination and hemolysis in any phase of testing.** | **COMPATIBLE** | This is a negative test result and indicates a serologically compatible crossmatch. |

**Attachment 2: Limitations of Crossmatch Methods**

**Limitations of Immediate Spin Crossmatch**

1. Some ABO-incompatibilities may not be detectable by the immediate-spin

crossmatch when the recipient's antibody is of low titer or the donor

antigen is poorly expressed.

1. Any patient demonstrating a clinically significant antibody in

pretransfusion antibody screen tests requires a crossmatch test that

includes the antiglobulin test to detect serologic incompatibilities.

1. Red cell units must be typed for the corresponding antigen and antigen

negative units must be crossmatched for patients with clinically significant

antibodies.

1. Errors in Rh typing will not be detected.

**Limitations of Indirect Antiglobulin Phase (AHG) Tube Crossmatch**

1. Some weakly reactive examples of antibodies may produce serologically

compatible crossmatches; however, the donor cells are truly incompatible.

1. Some ABO incompatibilities may not be detectable when the recipient's

antibody is of low titer or the donor antigen is poorly expressed.

1. Errors in Rh typing may not be detected.
2. Compatible crossmatches do not prevent possible isoimmunization of the
3. recipient or ensure normal red blood cell survival.

**Limitations of Crossmatch Gel Card Method**

1. Antibodies with levels below threshold level of detection may not be detected.
2. False positive results may occur if antibodies to components of the preservative

are present in the serum/plasma tested.

1. Significant variations in red blood cell suspensions may result in false-positive or

false-negative reactions.

1. Anomalous results may be caused by fresh serum fibrin, or particulate matter in

serum or plasma, or red cells that stick to the sides of the microtube. Anomalous

results with fresh serum (i.e. a line of red cells on top of the gel) may be

minimized by the use of EDTA plasma.

1. Adherence to the test procedure is critical to test performance.
2. Interpretation of mixed-field reactions must be done with caution. The presence

of fibrin, clots or particulates may result in some cells layering at the top of the gel.

1. Before concluding mixed field, review patient clinical information.
2. Some blood samples can occasionally develop fibrin clots when diluted, which may

interfere with the Gel Test. If this problem occurs, these samples should

be washed to remove the clots and resuspended in MTS Diluent 2.

1. Gel may not detect ABO incompatibility. Immediate Spin crossmatch is required.

**Attachment 3: Crossmatch Flowchart**

