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Owner: *Jessica Isaac: Executive Director-Lab-Academic Health Center*
Area: *Lab - Blood Bank*
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Indiana University Health

Requisition & Specimen Processing

PURPOSE:

To detail procedure for receiving, accepting/rejecting, storing requisitions (order requests) & specimens and checking patient history records for Blood Bank immunohematology testing.

SCOPE:

This SOP addresses critical control points for accepting/rejecting and processing requisitions & specimens received for testing at an IU Health Blood Bank location. This SOP is intended for all Lab Assistants, Senior Lab Assistants, and Transfusion Medical Technologists I and II.

EXCEPTIONS:

Exceptions must be approved by a member of the QA Unit.

DEFINITIONS:

COLLECTION DATE: Day Zero--date specimen drawn.

OUTREACH: Clients or Outpatient areas within IU Health System contracted by IU Health for testing.

QA UNIT: Members include Medical Director, Manager, BB Supervisors

TOTALLY MISLABELED: Specimen has been labeled with incorrect patient identification (ie. Wrong blood in tube).

POLICY STATEMENTS:

1. All Blood Bank specimens used for testing will be stored a minimum of 7 days post transfusion or 10 days from collection date.
2. Specimens may be collected up to 30 days before intended transfusion date when patient has not been pregnant, received cellular blood products in the last 90 days or has a history of a red cell antibody . See SOP Pre-Surgery Work-Up Process.

3. Specimens require two signatures on the label (Phlebotomist and Witness), unless collected by an electronic identification system (PPID).
4. Unlabeled specimens and specimens not meeting minimum labeling requirements are not acceptable.
5. Additional specimens requested for volume depletion of sample after the original collection date will have an ABO/Rh and IAT performed with results entered on a new accession number—order should be entered in Cerner by Nursing staff or MD.
6. All patients will have their previous history records checked in Cerner with each new sample.
7. All patients will have their Archival history records checked (AIMA) one time with documentation entered into the Cerner history record file.
    a. Patients with Medical Record Numbers (MRN) #725... or higher will not need BB Archive Checks (SOP How to Use AIMA Blood Bank Archive).
    b. Patients with MRN 800... and 900... will need AIMA BB Archive Checks.
8. When possible, use Post-It flags to aid in prioritizing samples.
    a. All "STAT" requests and requests for additional specimens will have "RED" Post-It Flag attached to the top of Requisition.
        - Time of sample receipt may be written on "RED" flag.
        - Ward may be called if specimen not received within "ONE" (1) hour.
    b. If an order has an additional red cell request, "Add on Order," then one may add a "BLUE Post-It Flag" to help visually identify what is needed for the patient.

PRINCIPLE/BACKGROUND:

None

MATERIALS:

Supplies:

Parafilm	Specimen Storage Racks
16 x 100mm test tubes	Specimen Labels

Equipment:

Centrifuge	Refrigerator
PC with Cerner software	PC with Archive Data software
Specimen Label Printer	

SPECIMEN REQUIREMENTS:

Minimum sample volumes are as follows:

Neonates – 3 years:	2	Lavender/Pink EDTA microtainers
3 years – Adult:	1	3 cc or 6 cc lavender/pink EDTA 3cc or 6/7cc red top tube, may be used if necessary.

NOTE: Serum separator tubes are NOT acceptable.

PROCEDURE:

1. Requisition processing:

A. Outreach and/or Client orders will be placed in Cerner or Life-Point by Registration/Client rep and may not generate a Requisition to print in Blood Bank. One may need to 'print screen' information in either "PPI" (Patient Product Inquiry) Cerner function or Power Chart to see tests ordered, unless copy of original order is delivered with specimen to Blood Bank.

B. In general, blood product and test requisitions, also known as orders, print directly to the Blood Bank.

C. Review Order Request. Minimum information on requisition includes:

1. Patient's First and Last name.
2. Patient's MRN (Medical Record Number).

   Outpatient's may have SSN (Social Security #) or DOB (Date of Birth) as identifiers when MRN is not available.
3. Date of Birth
4. Date of request.
5. Patient's location.
6. Physician's name.
7. Tests and/or quantity of blood components requested.
8. Intended time of transfusion.
9. Medical Indication for transfusion.

D. Use Cerner function "PPI"(Patient Product Inquiry) to obtain:

1. Patient's accession number for tests ordered; Click on Red test tube.
2. If product order requisition prints—and NO specimen orders displays in "PPI":
   1. Call Ward/Clinic or Client and request order for specimen (i.e. Type & Screen), if required.
      a. T and S required for RBC transfusion and Crossmatch
      b. T and S not required for Plasma, Platelet, Cryo order as long as the patient has a historical ABO/Rh without any PPI comment for Second ABO/Rh sample requirement.
   2. Document the call to the ward/clinic or client on the requisition with date/time, name of person receiving call and lab staff initials.
   3. Hang request on clip above control desk file until new specimen orders received.

4. Use Cerner function "Label Reprint" to print accession labels.
   a. Apply one large product order accession label to requisition, when applicable.
   b. Apply one large Type and Screen label to product order requisition that has a current Type and Screen completed. This label will be used for the "Add on Crossmatch."

2. Patient History (records) Search: Three Parts to the Patient History Search

A. Cerner PPI Search

1. Using "PPI" enter patient's MRN
2. Confirm patient name and MRN displayed in "PPI" matches requisition.
3. When blood type is available, record a ✓ checkmark next to blood type and one checkmark for each BB archive comment.
   a. When blood type is NOT available, record on requisition: "NC" (No Cerner)
   b. **For manual requisitions (print screen etc.), record the patient's blood type or any applicable history from Cerner if available.**
4. Person performing Cerner history check MUST initial requisition.

B. AIMA BB ARCHIVE Patient History (records) Search:

1. AIMA Requirement
   a. **Required by any MRN starting less than 725XXX**
   b. Required for Patients with MRN starting with 800XXX or 900XXX
   c. Not required for patient with MRN starting with "725" or higher
2. See SOP How to Use AIMA Blood Bank Archive to access historical information for patients and products entered in ADAC and Sunquest (legacy systems).
   a. **If archival data is present,** print archival data screen and attach to requisition.
   b. When there is no archival data, or patient's MRN# is above 725 -- write "NA" (No Archive Data) on requisition.
3. Person performing AIMA history check MUST initial requisition

C. Care **Web History Search**

1. **Log into CERNER Powerchart**

2. PowerChart PROD
3. **Click "Patient" from Task Bar**
4. **Search Patient by MRN**

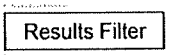
5. Once patient chart is retrieved

6. Select "Careweb" from Tool Bar

    a. Careweb should open with linked patient information at top left of screen and your identification (name) will appear in top center/right of screen.

7. Click on "Date Range" drop down arrow
    a. Change to "ALL DATES"

8. Click on "Results Filter" from center of page

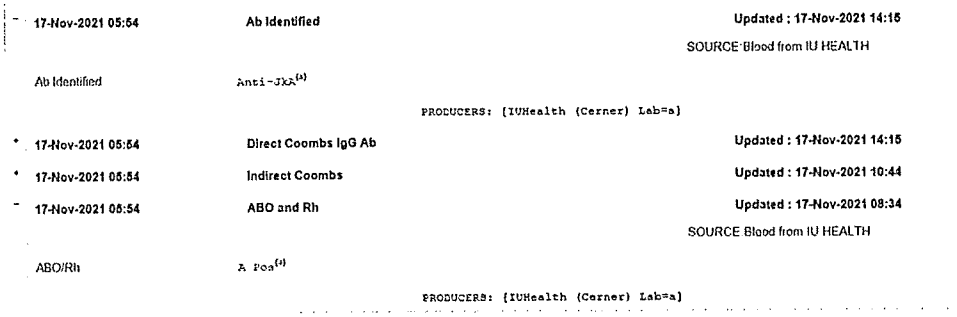


9. Select only the Blood Bank tests that are listed (if present)
    a. Example:

BLOOD BANK:

- [ ] Ab Identified
- [ ] ABO and Rh
- [ ] Direct Coombs IgG Ab
- [ ] Indirect Coombs
- [ ] Platelet Ab Scn %

10. Scroll to bottom of that *pop up* window and Select "OK"
    a. Only Blood Bank Test results will show
11. Review page(s) for previous ABO and RH results
    a. If found, Open the field to display results
    b. Look for any other Blood Bank testing history (Ab Identified etc).



12. Print results and attach archive history to current requisition

13. Document on Cerner or Manual Requisition "Careweb Hx attached" with your initials.

3. Updating Patient Product Inquiry (PPI) with archival data:

A. Must be performed by Medical Technologists (MT) only.

B. MT verifying 2nd Cerner ABO/RH or same sample ABO/RH Verify should enter Archive Comments in Cerner.

C. Enter Comments: "BB Archive checked" template.

D. Click "Comment", Click "Add", place cursor in "White" Comment box, Press "F2", Type "BB" in Name field, Click "Find", Select Template, Click "OK".

E. Enter confirmed transfusion requirements, i.e.; Leukoreduced, Irradiated, etc.

F. **Use BB Historical AB ID to result previously identified clinically significant antibody displayed in** patient's history **record (archive).**

4. Requisition Distribution:

A. **Place Order Requests waiting for specimen in file at control desk until specimen is received**

B. **"Add on XM Orders"— give to the applicable MT to complete**

C. **Component orders (not requiring specimen) – give to Component area**

5. Specimen Receiving:

A. **Pull Requisition from Control Desk file when specimen received. Be sure to double check requisitions hanging above file on clips for any missed product orders.**

B. **Verify information on specimen label and requisition are identical**

C. **Perform visual inspection of specimen and label:**

a. Each tube must have a label firmly affixed.

b. Patient's First and Last names

1. Unnamed trauma patients may be labeled with "Doe" and a number. Example: Doe, Seventyfive; Doe, Sixtyfour etc.

c. Patient's MRN

1. Outpatients may have SSN or DOB as identifiers when MRN not available.

2. Outpatients may have other unique identification numbers.

3. i. Kindred Hospital: Verify Kindred Hospital's unique identification number starting with "DA" or "HX"
ii.. Rehab Hospital (RHI): Verify RHI's unique identification number starting with "LM".
iii. Central Indiana Cancer Center (CICC) : Verify Cerner MRN#, unique identification number or SSN/DOB.
iv. Plainfield Correctional: Verify Plainfield Correctional's unique identification number starting with "LM" or patient's SSN.

c. Patient's Date of Birth

d. **Date** specimen collected

e. Patient's location

D. **Specimen Types:**

a. Samples for immunohematology testing (i.e. ABO/Rh, IAT, Newborn Profile, DAT): Lavender/pink-EDTA topped tubes are acceptable, including microtainers. Red top tubes **are acceptable for manual testing but not automated testing. Tubes do not need** to be full.

b. Samples for TEG:

1. For TEGCK, TEGCOMP, or TEGCKH, two 3.2% Sodium Citrate tubes (light-blue topped) must be present, and each tube must be filled to the indicated fill level.

2. For Platelet Mapping (PLTMP), a green-topped heparin tube must be present and filled to the indicated fill level.

3. Collection time must be within the last 2 hours. The collection time is assumed to be the time on the label. If the time on the label is more than 2 hours ago, then use Container Inquiry to determine the specimen collection time.
4. Specimens must be maintained at room temperature. Specimens that are shipped on cold packs or in a cooler must be rejected.
5. Identification of phlebotomist and witness: **NOTE:** applies only to samples for Immunohematology Testing (i.e. ABO/Rh, IAT, Newborn Profile, DAT):

E. Phlebotomist Identification for Blood Bank Specimens

1. Signature of nurse/phlebotomist drawing sample and signature of witness who verifies the specimen's accuracy must be on specimen label. The patient or patient's caregiver can sign as witness.
2. If less than two signatures are present on the sample, then check for PPID. PPID means that verification of the patient's identity was performed using scanned barcodes in Cerner
    a. **OUTREACH specimens NOT intended for blood product transfusions may** have only **One Signature, No Signatures or Initials only provided "PPI" is updated accordingly.**
        i. **Enter Comments: "BB Outreach Problem Sample" template for one** signature **specimens or specimens having no signatures or initials only.**
        ii. **Only the most recent "Problem Sample" Comment should be in PPI.** Remove **any previous comments.**
3. Verify PPID
    a. This is checked when specimen is received. When using the Specimen Log In App in Cerner by "accession".
    b. Next Click on the Container Inquiry App from Task Bar to observe if the sample was collected by PPID.
    c. Follow the If/Then decision tree below.

If...	Then...
PPID Collection is Present: Event Dispatched Collected Received PAID Collection PPID Collection Received Orders Added	Specimen is acceptable for Blood Bank testing
PPID Override is present *or* PPID is not present	Specimen is not acceptable for Blood Bank testing

4. Samples for TEG:

   For TEGCK, TEGCOMP, or TEGCKH, two 3.2% Sodium Citrate tubes must be present, and each tube must be filled to the indicated fill level.

F. Determine the need for 2nd ABO/Rh Sample and receive acceptable specimens

1. Review **PPI information** in **Cerner, archive check documentation and PPID** status.

If	**Then**
Patient **has no history of ABO/Rh and sample is PPID collected,**	Using DOE order ABO/Rh verify on the same accession.
Patient **has no history of ABO/Rh and** the sample **is not collected by PPID,**	Call ward/clinic or client and request a second ABO/Rh sample collection. Document on the Requisition the name of the person notified, date/time and BB staff member initials. Refer to ABO/Rh SOP and Job Aid for ABO Process for next steps.

2. Receive the sample in Cerner "Specimen Log-In" application.
3. Forward specimen and requisition to appropriate area for centrifugation.
4. Centrifuge the sample, as needed.

G. Reject unacceptable specimens:

1. Specimen is unacceptable when specimen does not meet labeling requirements
2. Receive specimen in Cerner "Specimen Log-In" application
3. Use "DOE" (Department Order Entry) to cancel test order w/ appropriate reason
4. Notify ward of need for a **Recollect and Reorder**

5. Document call on Requisition
    1. Date/Time of call
    2. Name of person receiving call
    3. Reason for unacceptable specimen
    4. Initials of Blood Bank Lab staff making the call
6. Remove Label from specimen and affix to order
7. Place requisition in Unacceptable tray and discard specimen in appropriate biohazard container.
8. When sample is TOTALLY mislabeled suspected as Wrong Blood In Tube (WBIT), the BB team member will document a Unplanned Deviation with details, and submit to supervisor for completion.

6. Specimen storage:
    A. After testing, All specimens **WITHOUT** Pre-Surgery questionnaire **will be stored in rack labeled with collection date.**
        a. Specimens used for testing will be stored a minimum of 7 days post transfusion or 10 days from collection date.
        b. **Exception to the above step is for samples with positive IAT or history of a** position IAT. **These will be stored in designated ABID racks.**
        c. **Donor segments used for IgG crossmatch will be placed in 16x100 tubes.** It is helpful when **storing** segments which have been opened, cover the tube with parafilm. Identify who the donor segments with patient identifiers, for example affix specimen label to tube.
            I. Segment tubes will be discarded after 11 days of storage.
    B. All **Eligible specimens with Pre-Surgery questionnaire will be stored separately: (Refer** to SOP BBT-016). **The pre-surgery samples are stored alphabetically** in Pre-Surgery Sample racks for up to **30 days until day of surgery/transfusion.**
    C. **When specimen is retrieved for additional** testing it should be returned to rack labeled with collection **date.**

7. File "Requisition" at completion of Testing/Component preparation in current days tray.

APPENDICES/ATTACHMENTS/FORMS/LABELS:

REFERENCES/CITATIONS:

AABB Technical Manual, current edition.
AABB Standards, current edition.

POLICY #:

BBT – 011

Attachments

No Attachments

Approval Signatures

Step Description	Approver	Date
CLIA Laboratory Director	Muhammad Idrees	02/2020
Medical Director/Division Director	Nguyet Le: Staff Physician	02/2020
Medical Director/Division Director	Daniel Smith: Staff Physician	02/2020
Endorsing on Behalf of Oversight Committee	Cynthia Watt: Project Coordinator	02/2020
Supervisors (QA Unit)	Jayanna Slayten: Supervisor-Lab	02/2020
Supervisors (QA Unit)	Evangeline Miguel: Supervisor-Lab	02/2020
Supervisors (QA Unit)	Tracie Ingle: Supervisor-Lab	02/2020
Director	Heather Vaught: Dir-Transfusion Medicine-Lab	02/2020

Applicability

IU Health Pathology Laboratory

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Owner:	*Jessica Isaac: Executive Director-Lab-Academic Health Center*
Area:	*Lab - Blood Bank*
Tags:	*Manual: Blood Bank Testing*
Applicability:	*Indiana University Health Pathology Laboratory*

Indiana University Health

ABO & Rh Determination, Manual Tube

PURPOSE:

To detail the procedure for performing and interpreting ABO and Rh testing on patient samples using tube methodology.

SCOPE:

This SOP addresses the critical control points in determining the ABO and Rh of patient samples to assure the safety and accuracy of pre-transfusion testing and blood and component therapy. This SOP enables qualified personnel to perform testing and interpret results in a reliable and reproducible manner. This procedure is to be followed by transfusion medicine (TM) staff trained to perform serological testing.

EXCEPTIONS:

Exceptions to this procedure must be approved by the Blood Bank Physician.

DEFINITIONS:

Autocontrol :2-4% suspension of the patient's red cells.

POLICY STATEMENTS:

1.0 Per AABB **Standard 5.16.2.2 and CAP checklist requirement (TRM.40670), two determinations** of the patient's ABO group **(Standard 5.14.1) must be made, one on a current sample and the second by one of** the following methods:

1. **Testing a second current sample**
2. **Comparison with previous records.**
3. **Retesting the same sample if patient identification was verified using an electronic identification system or another process validated to reduce the risk of misidentifications**

2.0 Follow the **Job Aid for the ABO/Rh Process:** Job Aid: ABO/Rh Process

3.0 ABO/Rh Testing Policies

1. The ABO/Rh Testing will be performed by using Plasma and Cells directly from the patient's original sample.

2. Exception to Forward and Reverse ABO testing
   - 3.2.1 Patients ≤ 4 months old do not require reverse typing
   - 3.2.2 CORD blood samples

4.0 ABO/Rh Testing is routinely performed on automated equipment. **See specific procedures for further information.**

1. Neo: BBGN-009
2. Echo: BBGE-004
3. Vision BBV-203

5.0 ABO/Rh Verify Policies

1. A Second Technologist should perform the ABO/Rh Verify testing, whenever possible.
2. Automated testing can be used for ABO/Rh Verify Testing.
3. Using a second sample for ABO/Rh verification is required for:
   a. Patients without a history of an ABO/Rh with IUH(or)
   b. Patients without a historical ABO/Rh from Care Web.
4. Second samples for ABO/Rh Verify Testing do not have to be signed or PPID collected, although this is preferable. The initial sample for xm is the initial sample received

I. PRINCIPLES/BACKGROUND:

None

II. MATERIALS:

Reagents

Anti-Sera:3-4%	RBC suspensions:
Anti-A	A_1 cells
Anti-B	B cells
Anti-A_1	Antibody Screen (ABS) cells
	A2 Cells
Anti-D	Coombs Control Cells (Check Cells)
Mononclonal Control	
Anti-human globulin (AHG-IgG)	

Supplies/Equipment

Test tubes (10 X 75 mm or 12 X 75 mm)	
Test tube rack	Serologic centrifuge
Isotonic saline	Heat block
Pipettes	Optical Aid
Marker	Automated equipment/supplies Microscope

SPECIMEN REQUIREMENTS:

Minimum sample volumes are as follows:

Neonates – 3 years:	1-2	Lavender or pink 0.5cc microtainers
3 years – Adult:	1	3cc or 6cc lavender or pink EDTA
3 years – Adult	1	3cc or 6cc red top, may be accepted if EDTA is not available

NO SERUM SEPARATOR TUBES ACCEPTED

III. PROCEDURE:

1.0 ABO and **Rh Determination:**

A. ABO RBC testing (forward type).

- **RBC testing (forward type) is used in combination with ABO Serum Typing (reverse type)** for all **patient samples > 4 months.**
- **RBC testing (forward typing) is used alone for all patient samples < 4 months old and CO**RD blood **samples.**

1. **Prepare a 2-4% RBC patient cell suspension.**
2. **Label 3-10x 75mm tubes: A, B and D along with a specimen identification.**
3. **Place 1 drop of the appropriate antisera in the labeled tubes.**
4. **Using a pipette, Add to each tube one drop of an approximately 2-4% RBC patient cell suspension.**
5. **Shake tubes gently to mix contents.**
6. **Spin in serologic centrifuge for recommended time (saline phase).**
7. **After centrifugation, gently resuspend cell button and examine macroscopically for agg**lutination. **An optical aid may be used to facilitate detection of weak reactions.**
8. **Read, record and interpret reactions (SOP BBT–007),**
   - **a)** **Refer to tables (1.4 and 1.5) for ABO and Rh interpretations.**
   - **b)** **See 2.0 for problem resolutions.**
   - **c)** **See 3.0 for computer entries.**
   - **d)** **After testing the tubes may be discarded in the sharps biohazard container.**

B. ABO Plasma/Serum Testing (reverse grouping)

- **Plasma/Serum ABO Testing is not required for patients ≤ 4 months old.**

1. Label 2 tubes: **A_1 and B** with specimen identification
2. Using a pipette, place two drops of plasma in each labeled tube.
3. Add one drop of the well mixed RBC reagent (2-4% suspension) into the appropriate tube.
4. Shake tubes gently to mix contents.

5. Spin the tubes in a serologic centrifuge for the recommended time (saline phase).

6. Gently resuspend cell button and examine macroscopically for agglutination. An optical aid may be used to facilitate detection of weak reactions.

7. Read, record and interpret reactions (SOP BBT–007)

   a) Refer to tables (1.4 and 1.5) for ABO and Rh interpretations.
   b) See 2.0 for problem resolutions.
   c) See 3.0 for computer entries.
   d) After testing, the tubes may be discarded in the sharps biohazard container.

C. Additional ABO/Rh Testing, when indicated

1. **Weak D: new patients ≤ 4 months that are negative at Immediate Spin (IS)**
   a) If a negative IS D test result is obtained, use the same tube for detection of weak D.

   b) Incubate the D test tube at 37 °C in the heatblock for 15 minutes. Set a timer.

   c) After incubation, wash contents of the tube at least 3 times with normal saline using an automated cell washer or manually using the Wash Setting for the centrifuge.

   d) After washing, add 2 drops of IgG-AHG and mix the tube gently.

   e) Spin in serologic centrifuge for recommended time (AHG phase).

   f) After centrifugation, gently resuspend cell button and examine macroscopically for agglutination. An optical aid may be used to facilitate detection of weak reactions.

   g) Read, record and interpret reactions (SOP BBT-007).
      (1) See table 1.5
         (a) If the weak D result is POS, then perform an IgG-DAT. See SOP BBT-005.
      (2) See section 3.0 for computer entries.

   h) If Weak D Testing is NEG
      (1) Add One (1) drop of Coombs Control Cells to all negative reactions, centrifuge and examine for macro agglutination and record on the appropriate computer / worksheet.
      (2) Failure of the Coombs Control cells to agglutinate renders the test invalid and the procedure must be repeated.
      (3) See section 3.0 for computer entries.

2. Monoclonal Control: Tested on patients typing AB, D Positive
   a) In a labeled tube, prepare a 2-4% patient red cell suspension.

   b) Label one tube for control and with patient identification.

   c) Add one drop of reagent monoclonal control and using a pipette one drop 2-4% suspension patient cells.

   d) Shake tubes gently to mix contents.

   e) Using a centrifuge, spin the tubes in a serologic centrifuge for the recommended time

(saline phase).

f) After centrifugation, gently resuspend cell button and examine macroscopically for agglutination. An optical aid may be used to facilitate detection of weak reactions.

g) Read, record and interpret reactions (SOP BBT–007).
(1) See section 3.0 for computer entries.

3. ABO/Rh Verify Verification or Testing
Patients without a previous history of ABO/Rh in Cerner require either historical verification of the ABO/Rh from CareWeb, testing of the initial sample collected by PPID for ABO/Rh Verify (or) a second sample collected to be tested for ABO/Rh Verify.

a) When to use the historical ABO/Rh
(1) When a patient has no history of ABO/Rh at IUH but has a historical ABO/Rh from another facility, we can enter the historical ABO/Rh in Cerner.
(2) In Cerner go to **Department Order Entry→**Accession Add-On→**BB** Historical ABO Rh→Submit
(3) Go to Cerner Entry 3.0

b) When to use the initial sample
(1) Use the same sample as the initial testing, when the sample is drawn by PPID method.
(2) Go to Step 1.3.3.4

c) When to use a second sample:
(1) When not collected by PPID
(2) Go to Step 1.3.3.4

d) Testing for ABO/Rh Verify
(1) In Cerner add the test ABO/RH Verify
(2) Complete ABO/Rh testing by manual or automated methods as described in the applicable automated method ABO/Rh (or) in this procedure steps 1.0-1.5.
(3) Complete Cerner Entry Per Step 3.0

D. ABO Interpretation:
ABO Determination (routine)[1]

	Reaction of RBC's with:		Reaction of Plasma with:		Interpretation
Anti-A	Anti-B	Monoclonal Control (Automated)[2]	A_1 Cells	B Cells	ABO
+	0	0	0	+	A
0	+	0	+	0	B
+	+	0	0	0	AB
0	0	0	+	+	0

+ = agglutination
0 = no agglutination
[1]Other combinations of RBC/serum reactions require further testing to determine the ABO
2 Monoclonal control results should be no agglutination. See Section 4

1.5 Rh Interpretation:

Rh Determination (routine)[1]

Reactions of RBC's with:				Interpretation
Anti-D (IS tube)	weak D		DAT	Rh (D)
+	Nd		nd	Rh pos
0	Nd		nd	Rh neg
0	+		0	Rh pos
0	0		nd	Rh neg
0	+		+	Indeterminant[1]

+ = agglutination
0 = no agglutination
nd = not done

[1]Other combinations of RBC/antisera reactions require further testing to determine the Rh. Evaluate cause of positive DAT

II. ABO/Rh **Problem Resolution:**
Base problem resolution on the results of the initial testing: Antibody problem (plasma/serum) or red cell problem.

Any of these resolution steps may be used in any order based on the sample results and the volume of sample available.

A. Weak or Missing Antibody
If an **"expected" ABO antibody is not present**

1. **Repeat the test using 3-4 drops of plasma.**
2. **Incubate the reverse group cells (A_1, B) with plasma at room temperature for 15-30 minutes to aid detection of weak antibody.**
   - **a)** After room temperature incubation, spin the tubes for the recommended time for saline phase testing. It is recommended to add an autocontrol to this testing to verify no mis-interpretation due to a pan-reactive autoantibody.
   - **b)** Read, record and interpret results.
   - **c)** If the room temperature incubation shows no reactivity, incubate the tubes from the above step at 1-6 C for 15-30 minutes
   - **d)** After 1-6C incubation, spin the tubes for the recommended time for saline phase testing. It is recommended to add an autocontrol to this testing to verify no mis-interpretation due to a pan-reactive autoantibody.
   - **e)** Read, record and interpret results.
   - **f)** Consult management if there continues to be no reactivity at 1-6C
3. **If the cells type as A or AB, but the A_1 reverse group cells agglutinate with the serum, do the following:**

B. Extra Plasma or Serum Reactivity

1. Suspected ABO Subgroup with anti-A1

a) Test the cells with Anti-A_1 Lectin and the plasma with A_2 cells.

b) See Group A subtyping table for interpretations.

Group A Subtyping:

RBC Reaction with:		"A" Interp	Serum Reaction with:			
Anti-A	Anti-A_1	Type	A_1Cells	A_2Cells	B Cells	0 Cells*
+	+	A_1	0	0	+	0
+	0	A_{SUB}	+/0	0	+	0

*** To resolve ABO discrepancy.**

2. Suspect Cold Autoantibody Causing ABO Discrepancy

a) Test plasma/serum with patient's autocontrol. A1 and B cells either by

(1) 37 °C for 10 minutes, spin, grade and record reaction on patient's requisition or Miscellaneous Form.

(2) Prewarm method grade and record reaction on patient's requisition or Miscellaneous Form.

b) Disappearance of discrepant reactions in reverse group (A_1, B cells) and patient's autocontrol indicates cold antibody interference.

(1) Document in CERNER PPI: COLD Autoantibody.

(2) ABO/Rh results can be reported as expected ABO, since discrepancy has been resolved, no further testing is required.

c) If discrepant (unexpected) reactions in the reverse cells (A_1, B cells) and patient cells still positive, proceed with further investigation including antibody identification.

3. Suspect Rouleaux Causing discrepancy

a) When rouleaux is noted, then use a saline replacement technique to resolve the patient's ABO type.

b) Document the use of saline replacement on the patient's requisition or using a Miscellaneous Form.

C. For ABO or Rh Discrepancies which may not be resolved:

1. Consult management if issuance of blood is needed prior to problem resolution

a) For immediate provision of blood when there is a question as to the ABO determination; use of type "O" blood for provision of transfusion.

b) For immediate provision of blood when there is a question as to the Rh determination; use of Rh negative blood for provision of transfusion.

III. CERNER ENTRIES

A. ABO/RH

1. Needs accession number:

a) Department Order Entry application→MRN→Enter

b) Highlight correct encounter, if needed→Enter

c) Orderable→type ABO→Enter; choose ABO and RH→OK

d) Requested Start Date/Time: Enter time prior to Specimen Received Date/Time

e) Click Submit icon; accession number will be located at bottom of screen

f) Proceed to section 3.1.2.1

2. Received with accession number: (ABO/RH or BB Historical ABO/Rh)

   a) **Result Entry** application→New Worksheet (defers to accession number)→OK
   b) Scan/Enter accession number→Result screen appears
   c) Enter appropriate results, if needed→Verify

B. New patients collected by PPID

1. **Department Order Entry**→Accession Add-On→ABORh Verify (for newborns: Newborn retype)→Submit
2. **Result Entry**→ New Worksheet (defers to accession number)→OK
3. Scan/Enter Accession Number→Enter results, if needed→Verify
4. **Patient Product Inquiry**→Comment Icon→Add→F2key→Name=BB→Find; highlight BB Archive→OK; repeat process for BB Classic
   Note: Outreach "Problem Samples" should not have Archive information entered in Cerner

C. ABO Control (Monoclonal Control testing for AB Rh+ patients)

1. **Department Order Entry**→Accession Add-On→ABO Control→Submit
2. **Result Entry**→ New Worksheet (defers to accession number)→OK
3. Scan/Enter Accession Number→Enter results, if needed→Verify

IV. Procedure Notes

A. Infants less than six months of age do not reliably produce antibodies on their own and maternal anti-A and/or anti-B may still be detected in their serum. Further investigation should be done on infants > a year old if forward and reverse typing does not match.

B. Reverse grouping on specimens from elderly patients sometimes show weaker reactions because this age group typically produces smaller quantities of antibody. Patients with agammaglobulinemia or hypo-gammaglobulinemia (hematology/oncology or bone marrow transplant patients in particular) may have undetectable levels of expected antibody.

C. Some samples with excess protein (notably cord bloods, specimens from multiple myeloma patients, or cells heavily coated with IgG molecules (as in AIHA) may spontaneously agglutinate or rouleaux and can cause ABO discrepancies.

D. Unmatched allogeneic Bone Marrow Transplant patients may have forward and reverse types that do not match. Refer to management if reactions do not appear to be consistent with donor and recipient types.

APPENDICES/ATTACHMENTS/FORMS/LABELS:

None

REFERENCES/CITATIONS:

AABB Technical Manual, current edition.
AABB Standards, current edition.

Policy #:

BBT – 003

Attachments

No Attachments

Approval Signatures

Step Description	Approver	Date
CLIA Laboratory Director	Muhammad Idrees	02/2020
Medical Director/Division Director	Nguyet Le: Staff Physician	02/2020

Step Description	Approver	Date
Medical Director/Division Director	Daniel Smith: Staff Physician	02/2020
Endorsing on Behalf of Oversight Committee	Cynthia Watt: Project Coordinator	02/2020
Supervisors (QA Unit)	Jayanna Slayten: Supervisor-Lab	02/2020
Supervisors (QA Unit)	Evangeline Miguel: Supervisor-Lab	02/2020
Supervisors (QA Unit)	Tracie Ingle: Supervisor-Lab	02/2020
Director	Heather Vaught: Dir-Transfusion Medicine-Lab	02/2020

Applicability

IU Health Pathology Laboratory

Indiana University Health

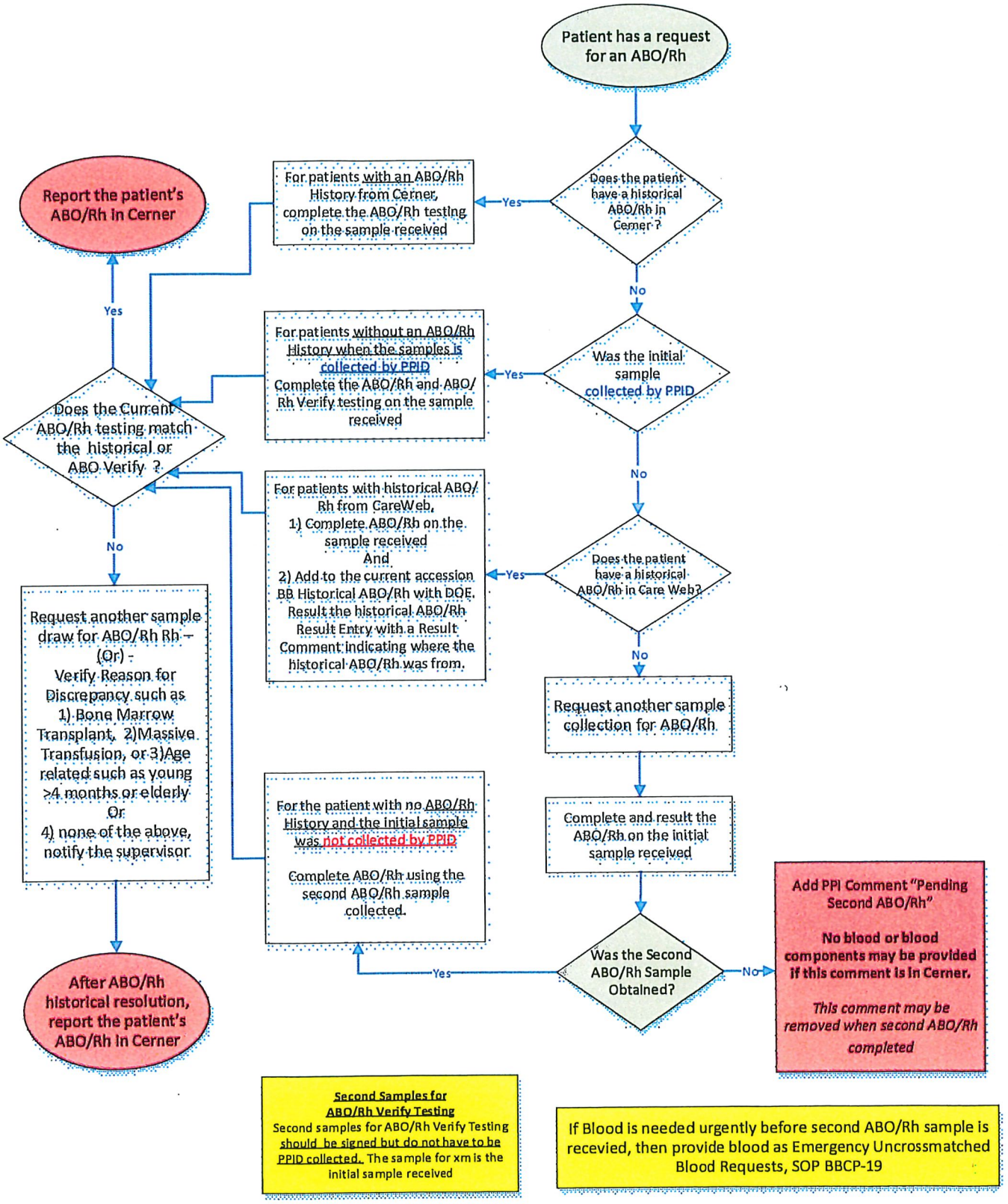
Indianapolis, IN 46202

Job Aid # BBT-JA0050

Manual: Testing

Job Aid: ABO/Rh Process

Original Effective: 12.01.2021



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Area: *Lab - Blood Bank*
Tags: *Manual: Blood Bank Testing*
Applicability: *Indiana University Health Pathology Laboratory*

Indiana University Health

NeoNatal Transfusion Program (NNP) Eligibility

PURPOSE:

To describe procedural steps for required testing in determining eligibility of neonates to receive transfusions during their first four months of life without crossmatch testing; or in the case where clinically significant maternal antibodies are present, which newborns are eligible for dedicated units after crossmatching an antigen negative unit.

SCOPE:

Details the procedure and policies related to providing RBCs for transfusion to **eligible neonates**, during **one admission**. To determine eligibility of neonates for NNP, the followings tests must be performed: a. Newborn ABO and Rh

b. Screen for Immune ABO antibodies for non group O neonates

c. Antibody Screen

d. Direct Antiglobulin Test

This SOP applies to All Transfusion Service Technologists I and II and Blood Bank Management.

EXCEPTIONS:

None

DEFINITIONS:

Neonates are defined as newborns ≤ 4 months of age.

POLICY STATEMENTS:

1. If a baby has a CORD Blood ABO/Rh, that is considered an adequate historical ABO/Rh result for the IUH Blood Bank ABO/Rh Process (see BBT-003).

2. Two microtainers are received for NNP testing. However, these sample are collected at the same time. One microtainer may be used for the initial ABO/Rh testing but the second sample may not be used for ABO/Rh Verify testing based on the patient's history check.

PRINCIPLE/BACKGROUND: None

MATERIALS:

Reagents:

Potentiating Media – LISS
Anti-Human Globulin (IgG - AHG)
Coombs Control Cells (CC) (IgG sensitized cells)
Anti-A, -B, -D and Monoclonal Control
A_1 and B Reverse Group cells
Antibody Screen cells (NOT POOLED) – I, II, and III MTS
IgG cards

Equipment and Supplies:

10 x 75 mm test tubes
Test tube rack
Marker
MTS pipettor and disposable tips
Disposable pipettes
Physiologic saline
Centrifuge(s) – MTS and Serologic
Cell Washers
Heating block/MTS incubator
Optical Aid (viewbox / agglutination viewer / microscope)

SPECIMEN REQUIREMENTS:

2 EDTA (lavender) microtainer tubes. All samples must meet identification criteria as outlined in Requisition & Specimen Processing.

PROCEDURE:

1. Newborn ABO, Rh Testing:
    1. Performed using pre-transfusion sample of Peripheral blood that is appropriately labeled.
    2. Forward typing, ABO / Rh including test for weak D. See SOP ABO & Rh Determination, Manual Tube.
    3. ABO Screen for immune ABO antibodies on all Non-"O" neonates: AHG-ABO Screen: (LISS enhancement testing method)

Newborn Front Type	Test	Newborn's plasma against:
Type A	→	A_1 reverse grouping cells
Type B	→	B reverse grouping cells
Type AB	→	A_1 & B reverse grouping cells

    a) Label for each test required (see above table) a 10 x 75 mm test tube with the neonate's identifier.
    b) Place 2 drops of neonate plasma in each of the labeled 10 x 75 mm tubes.

c) Add one drop of appropriate 2-4% reverse group cells, following the above chart.

d) Centrifuge according to the calibrated time and speed. Examine for hemolysis.

e) Gently re-suspend cell button and examine for agglutination.

f) Add 2 drops of LISS enhancement media to each tube, mix well. Another enhancement media may be used as directed by supervisor (follow manufacturer's instructions).

g) Incubate at 37°C for 10-30 minutes.

h) Remove tubes from incubator.

i) Centrifuge according to the calibrated time and speed. Examine for hemolysis.

j) Gently re-suspend cell button and examine for agglutination.

k) Wash the red cells at least three (3) times with large amounts of physiologic saline. An automated cell washer may be used for this purpose.

l) Add two (2) drops of IgG-AHG to the washed red cells, mix contents well.

m) Centrifuge according to the calibrated time and speed.

n) Gently re-suspend cell button and examine for agglutination. An optical aid may be used to facilitate detection of weak reactions.

o) Immediately grade reaction. Perform Cerner application. See section 9.0

p) Interpretation:

i. Positive reaction =Any agglutination or hemolysis at any phase of testing = **Positive for antibody (A, B or A,B) in neonate's plasma**.

a. Add Cerner comment "Passive Maternal Antibody Anti- ", record appropriate maternal antibody, in Patient Product Inquiry (PPI) comment box. See section 9.0.

ii. Negative reaction =No agglutination or hemolysis at any phase of testing = **Negative for antibody (A, B or A,B) in neonate's plasma**.

q) Add One (1) drop of Coombs Control Cells to all negative reactions, centrifuge and examine for macro agglutination. Perform Cerner application. See section 9.0.

a. Failure of the Coombs Control cell to agglutinate, renders the test invalid, the procedure must be repeated.

3. Perform Antibody Screen or Indirect Antiglobulin Test (IAT). See SOP Antibody Screen.

1. Plasma/Serum of either the Neonate or the Mother may be used when screening for unexpected antibodies.

2. If the mother's plasma/serum is used, add Cerner comment stating "Mother's plasma/serum is used" in PPI comment box.

4. Perform IgG Direct Antiglobulin test (DAT). See SOP Direct Antiglobulin Test (DAT)

5. Perform Cerner application. See section 9.0.

6. **NNP ELIGIBLE: No Crossmatch REQUIRED:**

1. **Negative for:**

1. IAT
2. Immune ABO screen, if required
3. IgG DAT.

2. **Positive Immune ABO screen:**
    1. Non Group " O " neonates:
        1. Neonate is type " A " or " AB ", the neonate is **NNP eligible** but **MUST** receive type " O " cells ONLY.
        2. Neonate is type " B " or " AB ", the neonate is **NNP eligible** but **MUST** receive type " O " cells ONLY.
        3. Add Cerner comment stating "Use "O" cells" in PPI comment box. See section 9.0.
3. **Positive IgG DAT:**
    1. Obtain serological information on the mother. If testing suggests ABO HDFN:
        1. Neonate is NNP Eligible but must receive " O " cells ONLY.
        2. Add Cerner comment stating "Use "O" cells" in PPI comment box. See section 9.0.

7. **NNP ELIGIBLE: Crossmatch REQUIRED:**
    1. **Positive IAT:**
        1. Further antibody identification must be done to determine NNP eligibility.
        2. Clinically significant antibody identified: the neonate is NNP eligible, (donor RBC units must be antigen negative for the known clinically significant antibodies).

EXCEPTION: Anti-D due to RhIg is considered clinically insignificant = NNP eligible: No Crossmatch required.

1. Antigen negative donor unit must be crossmatched prior to the first transfusion.
2. Aliquots from the same donor can be released without further crossmatching.

2. **Positive DAT:,** If the positive DAT is due to something other than ABO HDN, further Elution and antibody identification may be required to determine NNP eligibility. See SOP Elution- Rapid Acid (Gamma Elu-Kit ™ II).

8. **NNP NOT ELIGIBLE: Crossmatch REQUIRED:**
    1. Positive IAT with unknown specificity:
        1. The neonate is NOT eligible for the NNP.
        2. Neonates are treated like adults and crossmatched every three (3) days.
9. Cerner Application:
    1. NNP Eligible:
        1. Select "**Patient Product Inquiry** " (PPI) icon.
        2. **MRN** type patient's Medical Record Number.
        3. Select **"Comments"** icon
            1. Click "ADD"
            2. Use F2 key on keyboard to select appropriate comment

1. Name type "BB" <ENTER>
2. Select "BB NNP" <OK>
3. Highlight "ENTER DATE HERE", type eligibility expiration date (4 months from date of birth) <OK>

   NOTE: When passive maternal antibody is present, add comment by selecting "BB PMA".

3. When patient requires transfusion with group "O" red cells, add in comment box "Use "O" cells"
4. Select "**Transfusion Requirements**" icon
   1. Select "NNP" from "Available Requirements" box.
   2. "NNP" is defined as CMV Neg, Irradiated, and Leukoreduced.

2. ABO/Rh, Immune ABO screen and IAT Result Entry:
   1. Select "**Result Entry**" icon.
   2. Accession Number:Barcode or manually type accession number<ENTER>
   3. Display grid is highlighted for results/interpretations
   4. Enter reaction strength and interpretation in appropriate box <ENTER>
      1. Any of the following 3 methods may be used for result entry:
         1. Drop down box for result /interpretations
         2. Numeric key pads used with number corresponding to strength of reaction
         3. Type 1st letter of interpretation, then up or down arrow to select appropriate interpretation.
   5. For Immune ABO Screen, enter reaction in the AHG phase, if agglutination or hemolysis is observed in any phase of testing.
   6. When all results/interpretations are answered Select:<VERIFY>
3. Patient Discharged:
   1. Remove NNP eligibility in PPI comment box. Add comment "Patient discharged"
   2. When patient is readmitted and is ≤ 4 months of age, repeat Newborn ABO/Rh, ABO Screen (if applicable), Antibody Screen and DAT on a current sample to re-qualify neonate for NNP eligibility.

APPENDICES/ATTACHMENTS/FORMS/LABELS:

None

REFERENCES/CITATIONS:

AABB Technical Manual, current edition.
AABB Standards, current edition.

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BBT – 008

Attachments

No Attachments

Approval Signatures

Step Description	Approver	Date
CLIA Laboratory Director	Muhammad Idrees	02/2020
Medical Director/Division Director	Nguyet Le: Staff Physician	02/2020
Medical Director/Division Director	Daniel Smith: Staff Physician	02/2020
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Director	Heather Vaught: Dir-Transfusion Medicine-Lab	02/2020

Applicability

IU Health Pathology Laboratory