Specimen Collection, Centrifugation, and Transportation Guidelines for External Collectors

Policy

Newfoundland and Labrador Health Services (NLHS) accepts blood and urine samples collected in strict accordance with this guideline.

The primary purpose of this guideline is to promote a common quality standard across all modes of service delivery and to assure a culture of quality throughout all phases of laboratory diagnostic activity.

- Only routine tests listed in the document *Test Menu for External Collectors (Test Menu)* are approved for collection by private collectors.
- Specimens must be submitted within the timeframes set out in the Test Menu and must be delivered no later in the day than the time set out by the facility/site where the specimens are submitted.
- The Laboratory *Specimen Tracking Log* ch-1479 must be submitted with specimens.
- The requisition must indicate the date and time collected as well as the collector's identification.
- NLHS monitors non-conformances and responds by implementing corrective actions to reduce patient risk related to unacceptable practices.
- Specimen collection privileges are revoked when non-conformances are not addressed and there is long term repeated failure to meet quality standards.

Blood Sample Acceptability Guidelines

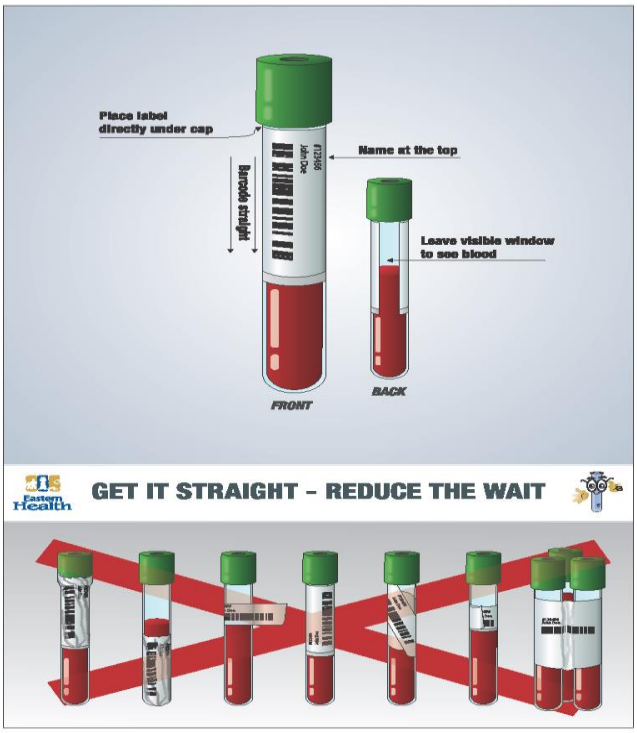
Follow NLHS policies for *Laboratory Requisitions* and *Laboratory Medicine Specimen Acceptance and Rejection Criteria* as well as detailed instructions in the specimen collection manual available on the External Collector Website, https://lab.easternhealth.ca/for-external-collectors/.

- Only specimens listed on the document *Test Menu for External Collectors* are to be collected and submitted to a NLHS lab for testing. Other tests have specific requirements that deem collectable only at an NLHS collection site.
- Only collection tubes that have been validated for testing them in the laboratory are permitted. If unsure if a specific brand is accepted, contact the laboratory.
- Collect all specimens into the appropriate tube paying close attention to correct order of draw and mixing of tubes as found on the laboratory website Specimen Collection Manual. All tubes must be filled to recommended draw volume for the tube. **Inspect the sample after blood draw to confirm volume**.

Corrective Action: If difficult to collect a full vacutainer specimen, collect sample into a BD Microtainer™ collection tube used for neonatal samples and immediately deliver to the laboratory for analysis.

- Mix each sample immediately after collection by completely inverting as follows.
  a. 5 to 6 times for gold top, serum separator tube (SST),
  b. 3 to 4 times for light blue top (citrate), and
  c. 8 to 10 times for tubes with another anticoagulant (e.g., Lavender (EDTA), Yellow, Gray (Sodium Fluoride), or Green (Sodium or Lithium Heparin).).
- Store collected samples in an upright position in appropriate conditions (room temperature, refrigerated, or frozen as required for test collected) until centrifuged and/or delivery to the lab.
- Clotted (serum) samples should be kept vertically to allow for clot time before centrifugation where applicable. Centrifuge between 30 and 120 minutes of collection for best quality. Samples collected in an anticoagulant can be centrifuged immediately after mixing.

  Note: Above is dependent on **s**pecific test order and special specimen handling and processing for that particular test.
- Correct patient identification is critical to timely and appropriate patient care. Refer to policy *Specimen Acceptance and Rejection Criteria* and for detailed requirements. To minimize risk of mislabeled specimens and ensure readable elements appear on the specimen, label as follows:
  a. Information on the label:
     - Two patient identifiers are required: client first and last names plus health care number.
     - Collection date, collection time, and collector's initials, mnemonics, or signature.
     - Source of specimen as applicable for microbiology, pathology, cytology, genetics, and flow cytometry.
  b. Placement of the label on the specimen:
     - Do not pre-label collection tubed prior to collecting the specimen.
     - Label Immediately *following* collection and in the presence of the client ensuring positive patient identification using two unique identifiers.
     - The specimen label for vacutainer tubes should be 2 inches x 1 inch.
     - Orient the long edge of the label along the length of the tube covering the manufacturers label with the print facing left to right and the left side of the label adjacent to the tube stopper.
     - Leave a gap at the back of vacutainer tubes where the blood sample can be seen/inspected.



- Indicate on requisition:
  a. Collection date and time.
  b. Collector's initials, mnemonic, or signature.

Urine Sample Collection and Acceptability Guidelines

All urine samples for routine urinalysis must be freshly collected using BD Urine Preservation System. Refer to document #17937 *Urine Collection and Preservation System.*

- Caution users on appropriate handling of urine collection containers as to avoid skin puncture through sharps in the cover.
- Immediately mix gently and transfer the standardized aliquot of urine to the appropriate tube type as found in the test menu and other specimen collection documents available on the laboratory website.
- All aliquoted urine samples must be appropriately labelled in same manner as blood tubes. All tubes must be held in an upright position following transfer to prevent leaking.
- Discard urine collection cup lid in a sharps waste container.

Centrifuge Guidelines

Improperly centrifuged specimens significantly contribute to inaccurate test results. It is imperative that the cells are fully separated from the plasma or serum. The centrifugal force and time of centrifugation are critical to ensure adequate separation of the cellular component.

- Gold top 3 mL SST are the standard collection tubes for clinical chemistry tests. Other collection tubes have an anticoagulant to prevent clotting when properly mixed.
- SST tubes must be allowed to clot for 30 minutes before centrifugation. After 30 minutes, confirm that a solid clot has formed. A tube is ready for centrifugation if the solid clot has retracted from the sides.
- All tubes that require centrifugation should be centrifuged ASAP. Allow time for specimen to clot where applicable, but no more than two hours following collection for best quality. Primary collection tube will remain with stopper intact/on until specimen handling and processing is required. For example, when aliquoting and separation from cells or gel required.
- Following Centrifugation, check to confirm that cells and serum/plasma are separated. All centrifuged samples must have serum/plasma separated from the cells. If the serum/plasma separator gel layer is on an *angle* following separation, this is a strong indication of an improperly centrifuged specimen. **UNDER NO CIRCUMSTANCE SHOULD A TUBE BE RE-CENTRIFUGE OR RE-SPUN – THIS COMPOUNDS THE PROBLEM AND CAN LEAD TO SIGNIFICANTLY INACCURATE TEST RESULTS.**

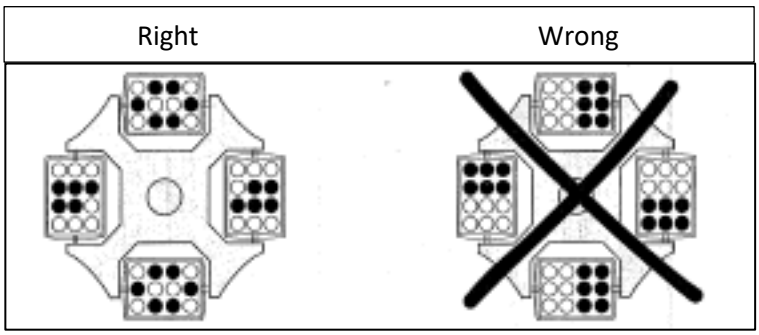
  Corrective Action: Using a disposable pipette remove the serum into another properly labelled aliquot tube (plain tube with no anticoagulant) and centrifuge that aliquot tube (with stopper in place) and then pour into another properly labelled aliquot tube (plain tube with no anticoagulant) being careful not to disturb the cell button at the bottom. Note on the S*pecimen Tracking Form* that sample was aliquoted and recentrifuged. **Samples received in this manner are acceptable.**
- While it is difficult to completely prevent hemolysis (red cell breakdown), the number of tubes with visible hemolysis should be infrequent. Collection sets with small gauge needle and slow collections contribute to hemolysis. Hemolyzed samples are monitored by the laboratory as a quality metric and excessive rates represent a non-conformance.

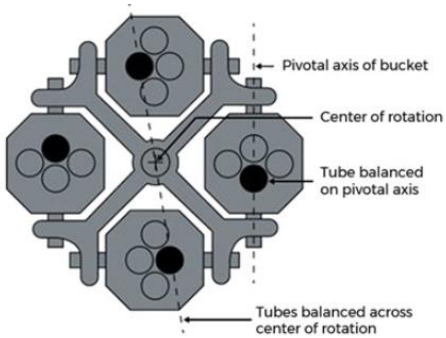
Centrifuge Setup and Use

Each Centrifuge must have functions verified upon installation to ensure it is working as expected and the appropriate RCF (speed) must be set up. Refer to document #14711 *Centrifuge RCF (g force) Determination* in setting the centrifuge to the correct speed and time of centrifugation.

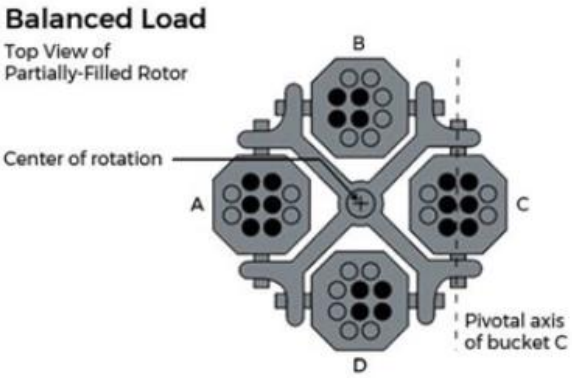
- NLHS requires the use of a swinging bucket centrifuge. Samples from fixed angle centrifuges are not accepted.
- Balance the centrifuge according to manufacturer's specifications with the same sample tube type containing the same amount of liquid (water is suitable). This will prevent excessive vibration and breakage of specimen tubes. See the images below for recommendations on proper balancing.

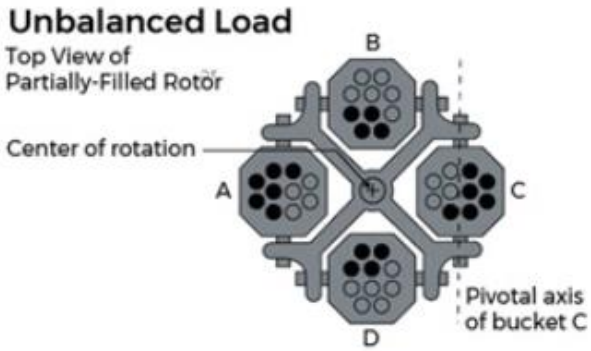
❖ Ensure bucket covers or rotor lids are in place prior to starting the centrifuge.





- Do not run with missing buckets.
- Partially filled buckets should be arranged symmetrically with respect to the pivotal axis of each bucket and across the center of rotation.





Centrifuge Safety

- Follow manufacturers maintenance schedule and safety precautions.
- Don appropriate personal protective equipment (PPE) when loading and unloading centrifuges. Universal precautions include lab coats, gloves, and face/eye protection where risk of droplets or aerosols exist.
- Bucket and rotor covers are used to prevent infectious aerosols from forming in the room – particularly if a tube breaks during centrifugation. Operate a centrifuge with properly fitted bucket or rotor covers.
- Never open the centrifuge lid while the rotor is moving. If the centrifuge comes with a safety interlock switch, there must be no tampering with the safety mechanism. If the switch is broken, do not operate the centrifuge until the switch is repaired.
- Allow the centrifuge to come to a complete stop prior to attempting removal of tubes. Open lid and remove tubes carefully. If a tube has broken in the centrifuge, immediately close the lid allow 30 minutes for aerosols to settle prior to opening.
- If a tube has broken in the centrifuge, allow 30 minutes for aerosols to settle prior to opening the centrifuge. The centrifuge must be cleaned and disinfected using an approved disinfectant and while wearing appropriate personal protective equipment and using forceps to pick up broken pieces.
- Centrifuges must undergo regular maintenance as described in the user manual for the equipment, and include at minimum:
  - Daily cleaning
  - Checked at regular intervals for accuracy by using a tachometer to verify the centrifuge RPM.
  - The timer on the centrifuge must also be checked at regular intervals (at least annually) for accuracy.
  - All other maintenance as recommended by the vendor must be performed (e.g., change brushes).

Storage and Transportation

All blood and urine specimens must be appropriately packaged and maintained in an upright position during all steps from collection to delivery into the laboratory. Refer to the specimen packaging and transport documents available on the laboratory website.

- All samples must be maintained at the appropriate temperature for the particular test during storage, transport, and delivery to the laboratory.
- Transportation of biological specimens is governed by Transport Canada (Government of Canada) under the Transportation of Dangerous Goods Act and Regulations. Information on transportation of dangerous goods is provided on the laboratory website.

- All samples must arrive at the laboratory within the timeframes set out in the *Test Menu for External Collectors* available on the laboratory website, https://lab.easternhealth.ca/for-external-collectors/specimen-transport/.
- Specimen quality non-conformances are monitored as quality indicators to ensure appropriate specimens are processed in the lab and accuracy of test results. See Table 1. Private collectors are responsible for meeting all indicated standards until delivery of samples to the laboratory. NLHS reserves the right to attend the site of collection to audit processes to ensure compliance with specimen quality protocol.

Courier Parking and Transport Requirements

- Concord Parking Services requires all private blood collection providers to display a valid permit when using hospital courier drop-off slots. A valid permit must be displayed while dropping off samples and is lawful for 15 minutes. Individuals who park in non-designated locations or who do not display a valid permit will be subject to a parking ticket.
- As of Jan 16,2025, parking permits are available through the application process.
- Please print and add your private collector number in the permit # space (e.g., Permit # 001).

Table 1 Example of Quality Indicators that may be collected.

Quality Indicator	Description	Benchmark
Incompletely filled Tubes	Percentage of: Number of samples with insufficient sample volume/Total number of samples.	<0.1%
Blood tube stopper removal	Percentage of: Number of samples where original stopper removed and TCO2 ordered/ Total number of samples	<0.1%
Late arriving samples	Percentage of: Number of samples with excessive transportation time/Total number of samples.	<0.2% of tubes
Inappropriate time in sample collection	Percentage of: Number of samples collected at inappropriate time of sample collection/Total number of samples.	<0.4
Wrong sample type for test	Number of samples collected in wrong container or unauthorized tests/Total number of samples or Percentage of: Number of samples of wrong or inappropriate type (i.e., whole blood instead of plasma) or unauthorized/Total number of samples.	<0.05%
Hemolyzed samples	Percentage of: Number of samples with free Hemoglobin >0.5 g/L (clinical chemistry)/Total number of samples (clinical chemistry)	<2.6%
Contaminated samples	Percentage of: Number of contaminated samples rejected/Total number of microbiological samples.	<6%
Samples not received	Percentage of: Number of samples not received/Total number of samples	<1.1%
Inappropriate transport temperature	Percentage of: Number of samples transported at inappropriate temperature/Total number of samples.	<0.6
Clotted samples	Percentage of: Number of samples clotted/Total number of samples with an anticoagulant.	<0.6%
Misidentification errors (< 2 identifiers on tube label)	Percentage of: Number of mislabeled samples e.g., fewer than two identifiers /Total number of samples.	<0.3%

References

BD Vacutainer® blood collection tubes.https://www.bd.com/en-us/offerings/capabilities/specimen-collection/blood-specimen-collection/venous-collection/bd-vacutainer-blood-collection-tubes

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