

## Collection, Labeling and Delivery of Laboratory Specimens

### I. POLICY

To ensure proper collection of specimens, refer to instructions in the [online Lab Manual](#). Specimens must be properly labeled using a minimum of two patient identifiers. Timely delivery of specimens ensures specimen viability and accuracy in test results.

### II. PURPOSE

To provide providers and support personnel instructions on collection, labeling and delivery of laboratory specimens.

### III. PROCEDURE

#### A. Collection and Labeling Specimens:

1. Refer to the Specimen Collection instructions in the [online Lab Manual](#). Every effort should be made to obtain the required amount of specimen.
2. For 24 hour urine collection guidelines, see section below. Refer to procedure on Collection of Pediatric Specimens for specific information regarding obtaining blood specimens from pediatric patients and a list of minimum blood requirements.
3. The collection tube or container required for collecting a specimen for individual tests is specified in the [online Lab Manual](#). Use only containers with “in-date” expiration dates. To ensure that the specimen is routed immediately to the appropriate laboratory division, use the correct container or tube type and provide the specified amount of specimen for each laboratory test to ensure accurate test results. For example, measuring potassium on a sample using potassium EDTA as the anticoagulant will be inaccurate, and measuring calcium on a specimen containing EDTA will also be inaccurate because EDTA chelates calcium. Oxalate in a gray top tube inhibits several enzymes, including Lactate Dehydrogenase (LDH) and acid phosphatase. **Never mix the contents of different collection tubes to avoid cross- contamination with tube additives.** Small volume pediatric tubes (1.8 mL light blue top) should be used for pediatric patients, and patients with difficult veins.
  - a) Order of Draw: The following order is recommended when drawing

several tubes during a single venipuncture to avoid test result error due to cross-contamination from tube additives, according to the Clinical & Laboratory Standards Institute (CLSI, document H3-A5):

- i. Blood culture tube or blood culture bottles
- ii. Light blue top coagulation tube
- iii. Gold top serum tube with clot activator/serum separator
- iv. Plain red serum tube with clot activator
- v. Royal blue top serum tube for trace metals
- vi. Light green with lithium heparin and gel separator; dark green lithium heparin, without gel; bright green sodium heparin, without gel separator
- vii. Pink top plasma tube for blood bank; white top (PPT) with separator; tan top for blood; lavender top tubes – all containing EDTA preservative
- viii. Gray top plasma tube with glycolytic inhibitor

| Order of Draw:                                        |                |
|-------------------------------------------------------|----------------|
| 1                                                     | Blood Cultures |
| 2                                                     | Light Blue     |
| 3                                                     | Gold           |
| 4                                                     | Red            |
| 5                                                     | Royal Blue     |
| 6                                                     | Green          |
| 7                                                     | Lavender       |
| 8                                                     | White          |
| 9                                                     | Pink           |
| 10                                                    | Tan            |
| 11                                                    | Gray           |
| Thoroughly mix all specimens by inversion 8-10 times. |                |

4. See description below of blood specimen tube types, including size of the tube, maximum volume of blood drawn, contents (preservatives, anticoagulants or clot activator, recommended times to invert tubes to facilitate mixing of the sample, and comments:

- a) **Light Blue Top Tube**, 2.7 mL whole blood draw volume. Contains 0.3 mL of 3.2% (109 mM) buffered sodium citrate to chelate calcium, preventing coagulation. Invert gently 5 times to mix. **Tube must be filled completely for tests requiring plasma, mainly coagulation studies.**

- b) **Gold Top Gel (SST) Tube**, 13 x 100 mm, 5 mL. Contains silica particles on tube walls that act as clot activator, and a gel separator. Invert 5 times to mix. Use for chemistry and serology determinations requiring serum.
- c) **Red Top (non gel) Tube**, 13 x 100 mm, 6 mL. Does not contain preservative, gel separator, or anticoagulant. Silica particles on the tube wall act as clot activator. Invert 5 times to mix. Use for certain reference laboratory tests. Not acceptable for Transfusion Service (Blood Bank) specimens.
- d) **Royal Blue Top Tube – Trace Metals**. 13 x 100 mm, 6 mL. Does not contain preservative, gel separator, or anticoagulant. Silica particles on the tube wall act as clot activator. Invert 5 times to mix. For trace element studies such as copper and zinc.
- e) **Light Green Gel (PST) Tube**, 13 x 100 mm, 3.5 mL. Contains 59 USP units of lithium heparin and gel separator. Invert 5 times to mix. Used for STAT chemistry tests, troponin, liver and metabolic panels, ammonia.
- f) **Dark Green Top (non gel) Tube**, 13 x 75 mm, 3 mL. Contains 51 USP units of lithium heparin. Invert 8 – 10 times to mix. Use for ionized calcium, methemoglobin when not ordered as part of arterial blood gas. Use two tubes for TB Quantiferon.
- g) **Bright Green Top (non gel) Tube**, 13 x 100 mm, 6 mL. Contains 86 USP units sodium heparin. Invert 8 – 10 times mix. Use for cytogenetics and FISH studies.
- h) **Yellow Top glass tube, SPS-** Used for Mycobacteriology (AFB) culture, and for bone marrow bacterial, fungal and mycobacteriology cultures. Invert 8 – 10 times to mix preventing coagulation.
- i) **Pink Top Tube**, 16 x 100 mm, 10 mL. Contains 18 mg of K2EDTA (sprayed on) to chelate calcium, preventing coagulation. Invert 8 – 10 times to mix. Use only for the Transfusion Service (Blood Bank) testing. Requires a full tube of blood.
- j) **White Top EDTA (PPT) Tube**, 13 x 100 mm, 5 mL. Contains 9 mg of dried K2EDTA and gel separator. Invert 8 – 10 times to mix. This tube is used for HIV, HBV and HCV viral load or quantitation.
- k) **Tan Top Tube** - 13 x 75mm, 3 mL. Contains 5.4 mg of powdered K2EDTA for blood lead and heavy metal screen. Invert 8 – 10 times to mix. Requires a full tube of blood.
- l) **Lavender Top Tube**, 13 x 75 mm, 4 mL. Contains 7.2 mg K2EDTA to chelate calcium, preventing coagulation. Invert 8 – 10 times to mix. Minimum required volumes: CBC + PLT - 1 mL, ESR - 2 mL, hemoglobin electrophoresis, Hgb A2, and F - 5 mL, G6PD, quantitative - 1 mL, and renin - 5 mL. Hgb H prep, Heinz bodies, fetal hemoglobin stain - 1 mL, CD4/CD8 - 1 mL.
- m) **Gray Top Tube**, 13 x 75 mm, 4 mL. Contains 10 mg sodium fluoride to inhibit glucose metabolism; 8 mg potassium oxalate to chelate calcium and prevent coagulation. Invert 8 – 10 to mix. Minimum required

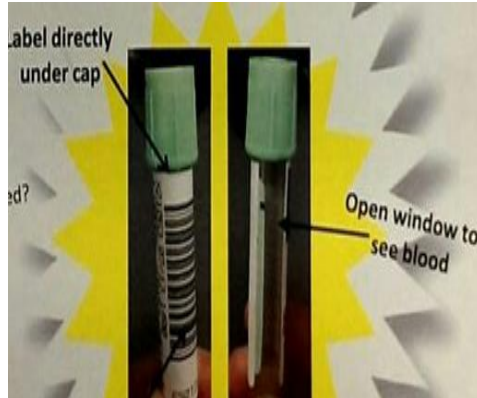
volume: Glucose determination 2 mL. There is no preservative to inhibit glucose degradation in green or gold top tubes.

5. Microtainer Blood Collection Tubes have non-sterile interiors and contain the following: Refer to Pediatric Specimen Collection Procedure.
  - a) **Lavender Tube** (250-500 mcL) - Contains EDTA Na<sub>2</sub> (Disodium EDTA) sufficient to anticoagulate 500 mcL of capillary blood. Mix by inverting 10 times. This tube is used for hematology tests and blood lead on pediatric and newborn patients.
  - b) **Amber Tube** (500 mcL) - This tube is used to collect and separate capillary blood samples for maximum usable serum yield. This system is composed of a plastic tube with inert barrier material and a yellow lid. Mix by inverting 10 times. This tube is used for bilirubin and drug levels on pediatric and newborn patients.
  - c) **Green Tube** (200-400 mcL) - Contains lithium heparin. Mix by inverting 10 times. This tube is used for most STAT chemistry tests.
6. Specimen containers **must be labeled in the presence of the patient**. The specimen must have a minimum of two patient identifiers:
  - a) Patient's First and Last Name.
  - b) Medical record number (MRN)
  - c) Date of Birth

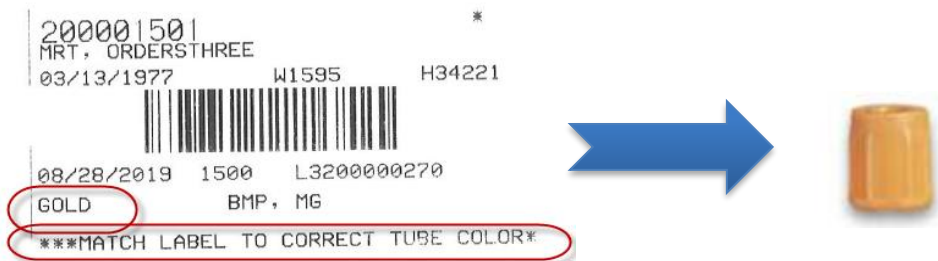
NOTE: For Blood Bank specimens, Date of Birth should not be used as the second identifier. The minimum requirement for Blood Bank is the patient name and MRN.
7. Unlabeled or mismatched (name and/or medical record number on specimen does not match name and/or medical record number on the manual or electronic requisition) specimens, including STAT specimens, will be rejected and discarded. This will be recorded in the computer. The laboratory will notify the provider or unit if the specimen is unlabeled or mismatched. An exception is made for irreplaceable or invasively/surgically collected specimens, upon completion of the form "ZSFG Clinical Laboratory Confirmation of Specimen Identification." Exception specimens include:
  - Tissues or biopsies
  - Sterile body fluids; i.e., CSF, pericardial, synovial, gastric, peritoneal, pleural
  - Blood cultures

The Laboratory will contact the physician, nurse practitioner, or physician assistant (**not** a clerk, nurse or medical student) responsible for care of the patient at the time of the correction, who must come to the laboratory and confirm the identity of the specimen (and label it, if unlabeled). Testing will not be performed until the correction is made. The correction must be made within 24 hours or sooner, depending upon specimen stability. Note that most body fluids are stable for only 1 hour.

8. Place label directly under the specimen cap. Label must be straight and not crooked. Leave a window to see level of blood in the container.



9. If Patient Positive Identification (PPID) is used, match the lab label to the correct tube color.



a) Blood Culture (BC) Orders :

- One BC order= must collect 2 bottles (1 aerobic/blue cap and 1 anaerobic/red cap). Match label to correct bottle.
- Two BC orders = must collect in sets of two (two different collection times and preferably two different sites). Print labels separately.
  - Order 1: first collection – use 1 aerobic/blue cap and 1 anaerobic/red cap
  - Order 2: second collection - use 1 aerobic/blue cap and 1 anaerobic/red cap

- b) Labeling a “bullet” or microtainer tube: Partially affix the label on the tube as shown in the picture to make barcode scanning easier.



- c) Do not CANCEL a lab order in EPIC under the following circumstances;
    - i. after specimen has been collected and sent to lab (Call the lab at 628-206-8590 and request for cancellation.)
    - ii. if the LAB label does not print- USE a ZSFG label and send requisition
    - iii. duplicate orders because the lab system will auto-cancel these, if labels are printed at the same time
    - iv. Do not modify an order after label has been printed (Epic will cancel and reorder this test and follow the EPIC standard work.)
  - d) Write the collection time on the label when:
    - i. a ZSFG Label is used instead of a LAB label
    - ii. When a print time on LAB Label is > 1 hour from actual collect time
    - iii. When PPID/Collect is not used, or there is an error in processing with collection step (*example of error that user might see "Unable to collect order due to delays in specimen processing."*)
10. The laboratory will notify the ordering provider or unit if the laboratory is unable to perform a test for any reason. Reasons for rejection may include, but are not limited to hemolyzed specimens, clotted specimens, incorrect tube types, improper specimen identification, and lab accidents. The reason for cancelation will be documented in the electronic medical record.
11. If a blood or urine specimen is rejected by the lab and the order is canceled, recollect the specimen- label with a generic MRN label- write REDRAW on the specimen label (or write RECOLLECT on a urine specimen). **Exception:** If a specimen for Microbiology or Blood Bank order is rejected by the lab and the order is canceled, **re-order** and recollect the specimen.

## B. Urine Collection:

1. The Clinical Laboratory furnishes containers for timed (ex.: 5, 12, 24 hr) urine specimen collection, with preservative as necessary, upon request. Call Laboratory Support Services (Mon – Fri 0700-1600) at 628-206-8199 to request for the container. Containers may be stocked in the Main Lab as well; call 628-206-8590 for availability.

### Directions for 24 Hour Urine Collection

2. **Refrigeration is the most important aspect of specimen preservation.** All timed urine collections must be refrigerated during and after collection. Each container will be labeled with the preservative used, and instructions for collection of the urine specimen will accompany the container. Lab Support Services will supply properly cleansed and prepared bottles for other 24- hr urine tests or special tests not listed below. Call Specimen Collection and Management division at 628-206-8590 for further information.

|             |                                   |
|-------------|-----------------------------------|
| Aldosterone | 24 hr collection, no preservative |
|-------------|-----------------------------------|

|                                                      |                                                                                                                                                      |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Amino Acid Screen                                    | random, no preservative; first morning urine preferred                                                                                               |
| Aminolevulinic Acid (ALA)                            | 24 hr or random collection                                                                                                                           |
| Catecholamines                                       | 24 hr collection; random acceptable                                                                                                                  |
| Citrate                                              | 24 hr or random collection, no preservative preferred. Boric acid acceptable.                                                                        |
| Copper                                               | 24 hr or random collection, no preservative, use plastic container                                                                                   |
| Cortisol (Free)                                      | 24 hr or random collection, no preservative                                                                                                          |
| Creatinine                                           | 24 hr collection, no preservative                                                                                                                    |
| Cystine                                              | 24 hr or other timed collection, no preservative                                                                                                     |
| Epinephrine                                          | see Catecholamines                                                                                                                                   |
| Heavy Metal Screen (Arsenic, Lead, Mercury)          | 24 hr or random collection , use plastic container, no preservative                                                                                  |
| Homovanillic Acid                                    | 24 hr or random collection, no preservative                                                                                                          |
| 17-Hydroxycorticosteroids                            | 24 hr collection; 10 gm boric acid at start of collection, or no preservative OK. Random, no preservative OK if frozen within 15 mins of collection. |
| 5-HIAA                                               | 24 hr collection or random; no preservative                                                                                                          |
| Inborn Errors of Metabolism (Metabolic error screen) | 10 mL (3 mL minimum), no preservative                                                                                                                |
| 17-Ketosteroids                                      | 24 hr collection, no preservative                                                                                                                    |
| Lead                                                 | See Heavy Metal Screen                                                                                                                               |
| Magnesium                                            | 24 hr collection, 10 mL 6N HCl at start of collection                                                                                                |
| Metanephrines                                        | 24 hr collection, no preservative. Random acceptable.                                                                                                |
| Norepinephrine                                       | see Catecholamines                                                                                                                                   |

|                             |                                                                                                |
|-----------------------------|------------------------------------------------------------------------------------------------|
| Organic Acids Screen        | random collection only, <b>freeze immediately</b><br><br>9 mL (3 mL minimum), no preservatives |
| Oxalate                     | 24 hr collection, no preservative                                                              |
| Porphobilinogen             | 24 hr collection in dark bottle, <b>protect from light, refrigerate</b> . Random acceptable.   |
| Porphyrin                   | 24 hr collection in dark bottle, <b>protect from light, refrigerate</b> . Random acceptable.   |
| Porter Silber               | see 17-Hydroxycorticosteroids                                                                  |
| Supersaturation Profile     | 24 hr collection only, no preservative.                                                        |
| Vanillylmandelic Acid (VMA) | 24 hr collection, no preservative. Random acceptable.                                          |

### C. Delivering Specimens to the Laboratory

1. At ZSFG Hospital and select ZSFG clinics (e.g., Urgent Care Center, etc.) specimens can be sent to the laboratory via the Pneumatic Tube. Refer to the *Transport of Laboratory Specimens via Pneumatic Tube System* procedure. If a specimen cannot be transported via Pneumatic Tube, contact Messenger Service for delivery.
  - a) Specimens will be picked up by the ZSFG Messenger Service according to the Messenger schedule or by STAT pick up (call ext. 68010). During weekends and holidays, call the hospital operator to page the messenger for specimen pick up.
  - b) Loosely-capped containers and soiled requisitions pose a significant risk to all who come in contact with these contaminated materials. Messengers and laboratory staff are instructed to reject soiled leaking containers and/or soiled requisitions.
2. Clinics deliver laboratory specimens via ACE Courier. STAT deliveries can also be arranged by contacting ACE courier for STAT pick up.

### IV. **PROCEDURE NOTES:**

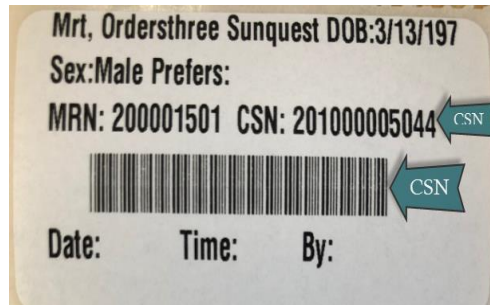
1. If a test is ordered and there is a collection task but there is already a specimen in the laboratory, you can change the frequency of the order to "Add-On."
  - a) Call the lab to verify if specimen is still available.
    - For Microbiology specimens- call 628-206- 8576



- For Blood Bank specimens- call 628-206- 8584
  - For all other specimens- call 628-206- 8590
2. If PPID was used and a label was printed, and collection cannot be accomplished within 1 hour of printing the label, cross out print time on the label and write the actual collection time.



- a) If a specimen cannot be collected within 8 hours of printing the label – cancel the order. Re-order the test when a specimen can be collected. NOTE: Container-specific lab labels cannot be reprinted.
3. Use a Generic CSN label, if:
- a) the lab test is going to PHL (i.e., GC/Chlamydia, TB Quantiferon), use a Generic CSN Label.
- b) specimen for POCT ABG, POCT VBG, POCT ACT, or other POCT (Point of Care Tests). If the ZSFG label does not scan, enter a valid CSN and not the MRN. Note: If MRN is entered, transmission of Blood Gas results from the lab system to Epic will be delayed.

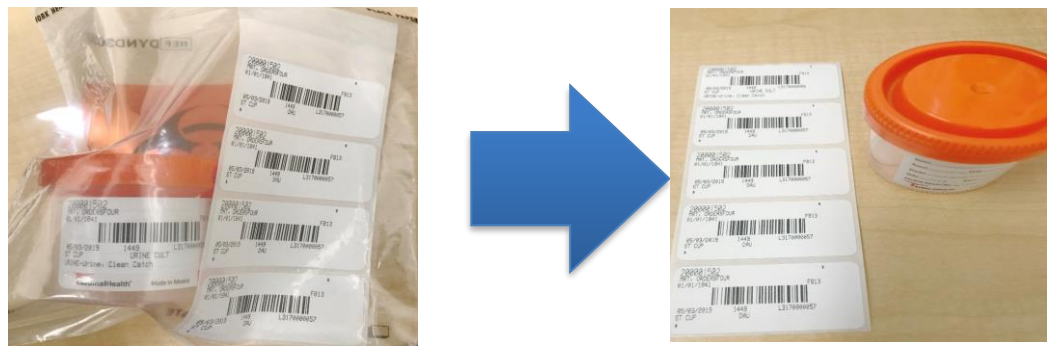


- c) a lab specific label cannot be produced **AFTER** “print label” task, use a Generic CSN Label
- d) the lab specific label is damaged or lost
4. When collecting a specimen for Fingerstick Glucose, Scan the barcode on the wristband. Note that this barcode is the CSN. If the wristband does not scan, print a ZSFG Generic label and scan the CSN barcode. If the ZSFG label does not scan, enter the CSN and not the MRN. Note: If MRN is entered, transmission of Glucose results from the lab system to Epic will be delayed.



5. If multiple tests are ordered on the same urine or a non blood specimen (i.e., CSF or body fluids), multiple labels will be generated.

- a) Place one label on the specimen and the other labels in the specimen bag. Scan each label and send all labels to the lab. Scan each label and send all labels to the lab.



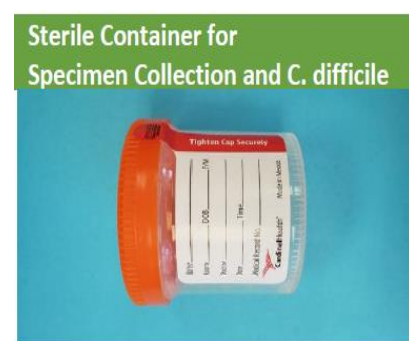
- b) Multiple labels will be generated according to the number of specimen containers required. Attach the correct label to the container. See below, examples of various stool collection containers.



- Preserves stool specimen for 72 hours.
- Unpreserved stool specimen (collected in plain container) is stable for only 2 hours.
- Not acceptable for *C. difficile* or parasites



- Preserves stool specimen for 7 days.
- Use for O & P, Giardia Antigen, Microsporidia
- Unpreserved stool specimen (collected in plain container) is stable for only 2 hours



- Provide the source
- Add 0.5 mL saline to biopsy & tissue specimens
- Acceptable for body fluids, sputum or urine specimens, AFB & Mycology cultures
- *C. difficile* stability: 24 hours