GENERAL INFORMATION
ORDERS AND RESULTS

ORDERING LABORATORY TESTS:
When ordering lab tests care should be taken to write orders legibly and
with as much detail as possible. Aliases and abbreviations should be avoided.

Inpatient Orders:
1. Clinical lab orders are placed by the unit into the Care-Manager system and
down load to the Lab Information System. Clinical lab specimens collected
in the unit by non laboratory staff should be accompanied to the lab with
specimen labels

Outpatients:
1. Outpatients will present with a completed order form to include:
   patient’s name, date of birth, date of service, tests requested, diagnosis,
   physician’s signature and date. Patients are to stop at the admissions
department to register before presenting to the lab. In the event that the
order is from part of an electronic health re
   cord the physicians signature
does not need to be present.
2. In the event that a patient is not able to bring the order with them and it
   needs to be faxed to the facility, please refer to the site specific directions
   below.
   a. For Covenant Medical Center: The order should be faxed to the
      admissions area (319 272 7100).
   b. For Sartori Memorial Hospital: The order should be faxed to the
      admissions area (319 268 3412).
   c. For Mercy Hospital, Oelwein: The order should be faxed to the
      admissions area (319 283 6053).
3. For ‘Add-on’ orders when the specimen for testing has already been
   collected and is in the laboratory, please mark clearly on the form that this
   is an ‘Add-on’ order and include date the original specimen was collected if
   known. Please refer to the site specific directions below.
   a. For Covenant Medical Center: The order should be faxed to the
      laboratory (319 272 8858).
   b. For Sartori Memorial Hospital: The order should be faxed to the
      laboratory (319 268 3050).
   c. For Mercy Hospital, Oelwein: The order should be faxed to the
      laboratory (319 283 6077).

Most blood specimens are kept in the lab for seven days. Requests will be added on
if the specimen meets the specific analyte stability and volume requirements.
If the add on request is not able to be accommodated, the office will be informed
by a phone call.

Referral Samples:
1. Samples must be labeled appropriately and be accompanied with
   a completed referral form.
2. If a referral form is not available, please send a complete order for the
   specimen and billing information.
REPORTING OF RESULTS:
Inpatients: When complete, results are filed to patient electronic health record.

Outpatient/Referral: Hard copies will be delivered/mailed to physician’s office. Some offices may elect to have results auto print instead of being mailed/delivered.

Faxing of results: If in addition to the hard copy that will print when all tests are complete, an office desires the results to be faxed as well, please include this comment and a legible fax number on the patient order.

TURN-AROUND-TIME:
1. If there will be a delay in any stat testing due to calibration, instrument breakdown, etc., the requester is to be notified immediately.
2. If testing for routine tests is delayed for greater than an additional day, the requester is to be notified.
3. The following turn-around-time listings are to be used as a general guide when used with “in-house” testing. (Cultures are excluded due to the nature of the test.)
   d. STAT: Resulted within one hour
   e. ASAP: Resulted within 2-3 hours
   f. Routine: Resulted within 4-8 hours

CALLING CRITICAL VALUES:
The Wheaton Franciscan Healthcare - Iowa Region policy on handling critical values will be followed. In general the following steps will be taken by the laboratory to notify providers of a critical value. The Wheaton Franciscan Healthcare-Iowa region policy on calling of critical values details the specifics of the procedure.
1. Once a critical value has been determined, responsible parties are notified within 10 minutes by the technologist performing the test. Verbally reported critical values require a verification “read-back” of the test result by the person receiving the test result. The results are to be written down and read back by a licensed caregiver.
2. If the patient is an inpatient, ER, ambulatory surgery, or any other outpatient clinic that is located within the hospital, the nursing station in charge of that patient is to be called with the result. If unable to contact the appropriate nursing area, the house supervisor will be paged and given the information.
3. If the patient is an outpatient or referral, the physician’s office is to be called. If it is after office hours, the physician is to be paged within 10 minutes. If the page is unanswered in 20 minutes, then notify the physician taking call.

NORMAL VALUES:
Normal values change from author to author and laboratory to laboratory. They are based on methodology and instrumentation. Lab values may vary
from lab to lab within the Wheaton Franciscan Healthcare System. In any case, current normal values or reference ranges will be reported with each test result, where applicable. Should a change in methodology result in a change in normal values, you will be properly notified.

Upon request, a list of current test methods including performance specification will be made available to clients.

TEST CANCELLATION
If a test needs to be cancelled after submission to the laboratory, contact the performing hospital lab; Covenant Medical Center 319-272-8842, Sartori 319-268-3030 or Mercy 319-283-6075.

1. Cancellation requests received prior to test setup will be honored and the test charge credited.
2. Test cancellation requests following test set up cannot be honored. Test results will be reported automatically and charged appropriately.

QUALITY CONTROL:
All laboratory sections participate in extensive quality control programs which include analysis of standard and control materials, as well as analysis of proficiency specimens provided by outside agencies. Detailed statistics are maintained for each test performed. The laboratory quality control program ensures the highest quality of test results on a continuing basis.

SPECIMEN COLLECTION & SPECIMEN PREPARATION

FASTING STATUS:
Fasting is defined as no consumption of food or beverage other than water for a minimum of 8 hours before testing. It is preferable that the patient fasts 12 to 14 hours before having fasting lab work collected. There may be times a physician will direct a patient with other instructions to supersede our recommendations. For lipid profiles, it is our recommendation that the patient be fasting for at least 8 hours prior to specimen collection. At times to accommodate patients requests, lipid profiles will be drawn from non fasting patients and this will be reflected on the report.

THERAPEUTIC DRUG MONITORING:
Sampling time is critical for therapeutic drug monitoring. Our recommendation is that most drug levels are to be drawn prior to next dose unless toxicity is suspected. Please refer to the individual drug listing in this manual for further information. It is important that last dose information accompany test request to ensure reporting of accurate results.

SPECIMENS FOR CULTURES
For accurate culture reports it is important that adherence to specimen collection and transport requirements occur. Refer to individual culture listing for transport method and specimen stability information.
When collecting wound cultures it is important that the wound tissue be swabbed, not just the surface of the wound. Swabbing the surface of the wound may result in contamination of the culturette with skin contaminants and may result in the pathogen not being able to be recovered in culture.

Microbiology orders need to have the source of the specimen included. If the source is not included in the order information (example: urine culture) please include the source on the specimen.

SPECIMENS FOR VIRAL CULTURES
Specimens for viral culture need to be added to a viral transport media as soon as possible post collection to maintain viral integrity. Viral transport media (M4 or M5 media) is available from the lab. Stool, CSF and sputum specimens may be kept refrigerated and transported on a cool pack. The media comes with a Dacron swab. Please use this swab to collect specimens as certain swabs may interfere with testing. If the swab is used to collect the specimen, place the swab in the media and break the swab at the pre-scored site, leaving the swab end in the media. Tightly cap the specimen, label it appropriately and store the specimen in the refrigerator until transport.

BLOOD COLLECTION TUBES
1. Red Top Tube: Is a plain collection tube with no anticoagulant. It is used for collection of serum for select chemistry tests. **If the specimen is able to be centrifuged prior to transport the serum should be taken of the cells and placed in an aliquot tube and labeled as plain red top serum.**
2. Red/Gray Marbled, Gold Top Tubes: This is a collection tube that has a clot activator and gel present in the tube as well that separates the cells from the serum postcentrifugation. The tube is referred to as a serum separator tube (SST) as well. If the serum needs to be frozen prior to transport it should be placed in a plastic aliquot tube, labeled as SST serum and then frozen. Do not freeze in the SST tube.
3. Light Blue Top Tube: This tube contains sodium citrate as an anticoagulant. It is generally used for coagulation studies. It is imperative that the tube be completely filled. The ratio of blood to anticoagulant is critical for accurate results. Invert tube end to end 6-10 times immediately post collection. If the plasma is taken off of the cells and frozen please label the aliquot tube as being citrated plasma.
4. Lavender/Purple Top Tube: This tube contains EDTA as an anticoagulant. It is generally used for hematological testing procedures. Invert tube end to end several times post collection.
5. Green/Light Green Top Tubes: Green top tubes contain some form of heparin. For general usage the tubes contain lithium heparin. The light green tubes also contain a gel that separates the cells from the plasma. After the tube has been filled with blood, invert the tubes several times in order to prevent clotting. If the plasma needs to be frozen prior to transport, aliquot off into a plastic tube and label as heparinized plasma.
*Note there are tests that are required to be drawn in a sodium heparin tube. If this type of tube is required please request one from lab.

6. Gray Top Tubes: Gray tubes contain potassium oxalate/sodium fluoride. The potassium oxalate is the anticoagulant and the sodium fluoride as a preservative (preserves glucose levels). Mix tube end to end post collection to prevent coagulation.

7. Dark (Navy) Blue Top Tubes: There are two types of navy blue tubes; one contains EDTA and the other is plain. These are used for the collection of trace elements. Refer to specific test listing for tube requirements and specimen handling.

**NOTE:** Best lab practice for specimens collected in plain red top tubes or green top tubes with no gel (in the case where plasma is needed) is to centrifuge the specimen (after clotting for the plain red top) and put the serum/plasma into an aliquot tube. In addition to labeling the specimen with appropriate patient information include the type of tube the specimen was collected in. This also applies when plasma is frozen from a light blue top tube due to delayed shipment.

Some tests require specialized tubes for collection or have special post collection handling instructions. Please refer to the specific test listing for instructions.

**CORRECT MIXING OF BLOOD SPECIMENS**
Once blood specimens are collected, proper and adequate mixing of the specimen will help ensure a satisfactory specimen.

1. Fill the tube to the correct volume using correct order of draw.
2. Gently invert tube end to end.
3. Repeat the inversion process 5-8 times.
4. Label the tube appropriately in the presence of patient.
5. Transport specimens to the lab in a timely manner.

**CORRECT ORDER OF DRAW FOR BLOOD SPECIMENS**

1. Blood cultures (need to be collected with a syringe as bottles are volume dependent.
2. Light blue - Sodium Citrate
3. SST – tube with clot activator
4. Red/Navy blue no aditive
5. Green - Heparin
6. Lavender/white PPT tube/navy blue with EDTA – EDTA
7. Gray – Oxalate/Fluoride
8. Yellow – ACD

For Capillary Draws

1. Capillary Blood Gases
2. Lavender – EDTA
3. Green – Heparin (with or without gel)
4. Red/SST – Serum tubes with or without clot activator or gel
5. Neonatal PKU cards
SPECIMEN LABELING AND TRANSPORT.
Proper specimen labeling, collection and transport ensure accurate testing and results. Please refer to specific hospital policies for patient and specimen identification procedures. Individual test listings will discuss special handling requirements as they vary from test to test.

**ALL specimens must be labeled in the presence of the patient by the person obtaining the specimen.**

Inpatient:

1. All specimens must be transported to the laboratory immediately following collection. Identification of the specimen must include patient labels insuring proper process of collection (scanning wrist band and specimens) Also the source of the specimen is to be included on the specimen when it is not apparent what the source of the specimen is (example: culture specimens, blood specimens collected by different modes).
2. For Blood bank tests, a typenex band is an additional required form of identification. Specimens which are not properly identified will not be accepted in the laboratory.
3. Specimen must be submitted in an appropriate, well-constructed container with a secure lid to prevent leakage during transport. (Example – tubes placed in biohazard bag.)
4. All specimens, except 24 hour urines, spinal fluids and surgical pathology containers, may be sent to the lab in the Translogic Tube System (Covenant Medical Center) following proper packaging instructions. All specimen containers must first be placed in a plastic biohazard bag and sealed prior to transportation.

Referral: Delivered to the lab through the site specific courier system.
Specimens should be labeled appropriately to include patient’s first and last name
Specimens should be transported in a biohazard bag with an absorbent material present in the bag.

Urine specimens should be placed in a separate biohazard bag to avoid contamination of other tubes if leakage should occur.

SPECIMEN REJECTION
There are times that specimens will not be suitable for testing. If this occurs on specimens collected in a physician’s office, the lab will notify the office.

1. **Inaccurate patient identification on test order form or specimen**— Regulatory certification requires that the specimen and test order must have complete and correct patient information.
2. **Hemolysis**—Hemolysis occurs when red blood cells are ruptured, releasing their contents into the serum or plasma portion of the blood. Hemolysis may invalidate test results, particularly potassium and lactate dehydrogenase.
   - Hemolysis can occur with:
     - a difficult venipuncture
     - use of a small lumen needle
     - pulling back too quickly on the plunger of s syringe
- not letting the alcohol dry completely especially on capillary draws
- forcing blood into a collection tube from a syringe
- excessive shaking of the tubes during mixing
- refrigeration temperature too cold
- freezing an un spun, un separated clotted specimen

3. **Quantity not sufficient for testing (QNS)**—QNS means that not enough specimen was submitted to perform the test(s) requested.

4. **Incomplete fill or over fill on Light Blue top tubes**—These tubes require a specific blood to anticoagulant ratio. If the tube is filled improperly the lab results may be unreliable.

5. **Clotted specimen**—Clotting in tubes with anticoagulant results from a failure to, a delay in, or inadequate mixing of specimen. The blood should be added to the tube immediately post collection if using a syringe. Also the tube should be gently inverted end to end 5-10 times after collection.

6. **Specimen collected in wrong container**—the presence or absence of an anticoagulant or the wrong anticoagulant will render test results invalid.

7. **Specimen exceeds acceptability timeframe**—Refer to specific test listing or call the lab for additional information as stability for each analyte varies.

8. **Specimen not held within temperature requirements**—Some tests have strict temperature controls that need to be applied to the specimen to maintain valid results. Refer to specific test listing for test specific information. Some tests may require specimens to be collected in the hospital setting.

   Temperature Definitions
   - Ambient (room) temperature: 15-30 degrees Centigrade; 59-86 degrees Fahrenheit
   - Refrigerate 2-10 degrees Centigrade; 36-50 degrees Fahrenheit
   - Freeze -20 degrees Centigrade or colder; -4 degrees Fahrenheit or colder. Do not allow thawing in transit.
   - On ice Specimen wrapped in a plastic bag then inserted in ice slurry

9. **Specimen not protected from light**—Some specimens need to be protected from artificial light or sunlight. This will be indicated in the specimen requirements. Protect these specimens by wrapping them in aluminum foil or equivalent or submitting in an amber colored tube.

**SPECIMEN PACKAGING**
Specimens are to be sealed inside a transport bag marked as *biohazard*. The bag should contain absorbent material capable of absorbing the liquid if the specimen were to leak or break in transit.

**BALANCING THE CENTRIFUGE**
To properly balance a centrifuge all tubes must be arranged symmetrically. To achieve the proper balance, tubes of the same size and volume are placed across from each other.

Balance tubes are made by filling an unused tube with water to the specific volume
needed to balance the centrifuge. You use a balance tube when there is an odd number of tubes or unmatched volumes. Improper balancing of the centrifuge will result in damage to the centrifuge and/or improper separation of cells from fluid. It is important to know specimen handling requirements as some tests cannot be centrifuged or have a time frame for separation to occur. Please refer to the individual test listing special requirements.

Serum tubes (plain red or SST tubes (red/gray marble top with gel or gold with gel) must be allowed to clot prior to centrifuging. (Approximate clot time is 30 minutes and possibly longer for patients on anticoagulant therapy or dialysis patients.) Specimens should be centrifuged within two hours of collection. Longer periods may result in inaccurate results. The centrifuge must come to a complete stop before lifting the lid. Do not use your hand to slow down or brake the specimen containers.

SUPPLIES FOR LABORATORY SPECIMEN COLLECTION
Areas are to order their supplies needed for blood collection through PMM. Other items are available from the lab. Some of the items available from the lab are blood collection tubes, culturettes, PAP smear items, viral media etc.

LABORATORY PERSONNEL AND RESPONSIBILITIES:
The Laboratory Service has devised rules and regulations within which the laboratory must function. They are necessary to promote efficient and productive operation of the lab. Laboratory personnel are charged with the responsibility of being familiar with all such rules and regulations and performing their duties in compliance with them.

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