LABORATORY 1: Urinalysis Lab Safety, QC, and Specimen Collection

Points are awarded for prelab assessments, skills, and completion of the study questions.

Objectives

1. Define the terms of Urinalysis (UA) Lab Safety, QC, and urine specimen collection including, but not limited to:
   a. Biohazardous
   b. OSHA
   c. PPE
   d. SDS
   e. Standards Precautions/Transmission Based Precautions
   f. Hospital and healthcare acquired infections
   g. Quality Control
   h. Lyophilized controls
   i. First morning, mid-stream, 24-hour, and clean catch urine specimens

2. Describe the major types of hazards that can occur in the laboratory setting.

3. Describe basic safety practices in the UA laboratory.

4. Identify and/or describe the signage that warns of threat of biohazard, electrical shock, radiation, physical or laboratory chemical hazards.

5. Describe quality control practices for the UA lab.

6. Analyze Standard Precautions, Transmission Based Precautions, and Protective Isolations for the nature of the infectious materials, the identification of who is infectious, who must be protected, what type of PPE required and how it should be disposed.

7. Demonstrate willingness and ability to search appropriate website(s) for additional information on transmission-based precautions and/or other topics.

8. Describe in writing and demonstrate in practice the proper hand washing techniques. Include a listing of times during the work day when the activity should be performed.

9. Describe in writing and demonstrate in practice the proper removal of potentially bio-infectious gloves.

10. Outline and follow appropriate Standard Precautions at all times in UA labs and clinicals.

11. Describe Transmission Based Precautions and appropriately apply them in simulated on-campus and actual clinical situations.

12. List the three routes of transmission upon which Standard Precautions apply and give an example of a disease/condition for each route.

13. Tour the MLAB/BITC laboratory areas for the purposes of:
   a. sketching a drawing of the laboratory and prep area floor plan;
   b. noting the location of all fire extinguishers, fire blankets, eyewash and emergency shower stations;
   c. identifying potential chemical hazards, noting their level of health, flammability, and reactivity threat;
   d. developing a primary and secondary fire/emergency escape plan that includes maintaining safety awareness for all persons present.

14. Describe the concept of quality assurance as it applies to the UA laboratory.

15. State the purpose of quality control in the UA laboratory.

16. Use quality control results to determine the acceptability of test results.

17. Provide verbal or written instructions for the collection of:
   a. Random or first morning, clean catch mid-stream urine specimens.
   b. 24 hour and other timed urine specimens

Overview of Laboratory Safety

The safety of students and workers in the laboratory is a major concern of regulation and accreditation agencies as well as faculty and employers. If unchecked, potential hazards in the laboratory could include biological, chemical, fire, radioactive, mechanical, and electrical hazards. The Occupational Safety and Health Administration (OSHA) is responsible for providing standards for safety in the workplace, including the laboratory setting. OSHA requires the availability of written safety manuals and organized safety programs for employee within the workplace.
**Biological Hazards**

Thorough attention to all aspects of safety is important in the clinical laboratory, a primary focus is prevention of infection by **biohazardous** materials.

Biohazardous materials can be found in a variety of settings both in and outside the laboratory setting. The level of the threat varies from minimal (where materials can be easily decontaminated) to serious (where materials must be autoclaved or incinerated). Tissue, blood and body fluids (including urine) are all considered biohazardous.

The Centers for Disease Control (CDC) has published guidelines for safe practice in the collection, handling and disposal of biohazardous materials. **Standard Precautions:**

In 1996, CDC published new guidelines, called the **Standard Precautions** for isolation precautions in hospitals. Standard Precautions utilized the major features of Body Substance Isolation (BSI) and to prevent transmission of blood borne pathogens, and BSI (body substance isolation - to reduce the risk of transmission of pathogens from moist body substances. **Standard Precautions applies to all patients receiving care in hospitals, regardless of their diagnosis or presumed infection status.**

Standard Precautions apply to

1. blood and all body fluids, secretions, and excretions except sweat, regardless of whether or not they contain visible blood;
2. non-intact skin;
3. mucous membranes.

Standard Precautions are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection in hospitals. **The components of Standard Precautions include Hand hygiene, Surface Disinfection, and use of Personal Protective Equipment (PPE).**

**Transmission - Based Precautions:**

In addition to the **Standard Precautions** applied to all patients; a second level of precaution (Transmission - Based Precautions) is used for the care of patients known or suspected to be infected by highly transmissible or epidemiologically important pathogens spread by airborne or droplet transmission or by contact with dry skin or contaminated surfaces.

There are three types of Transmission-Based Precautions:

- **Airborne Precautions** - designed to reduce the risk of airborne transmission of infectious agents by patients infected with epidemiologically important pathogens that can be transmitted airborne by way of very small droplets (measuring 5 μm or less) or dust particles containing the infectious agent. These very small droplets are able to remain suspended in the air for long periods of time allowing microorganisms carried in this manner to be dispersed widely through air currents. The microorganism may become inhaled by or deposited on a susceptible host with the same or nearby room; therefore, special air handling and ventilation (Airborne Infection Isolation Room/AIR room must have negative pressure ventilation and exhaust directly to the outside or through a HEPA filtration system) are required to prevent airborne transmission. PPE includes use of **high efficiency mask** which must be disposed of after leaving patient area and before returning to general area. Wash hands.

- **Droplet Precautions** - designed to reduce the risk of transmission of infectious agents by patients infected with epidemiologically important pathogens that can be transmitted by infectious droplets (larger than 5 μm in size). Droplet transmission involves contact conjunctiva or the mucous membranes of the nose or mouth often as a result of the source person coughing, sneezing, or talking or as the result of the performance of certain procedures such as suctioning and bronchoscopy. Transmission via large-
particle droplets requires close contact between source and recipient persons, because droplets do not remain suspended in the air. PPE includes mask for any person in close contact with the patient. ("Close contact" is defined as being within 3 feet of the patient.) Special air handling and ventilation are not required to prevent droplet transmission. PPE are disposed of after leaving patient area and before returning to general area. Wash hands.

Contact Precautions - designed to reduce the risk of transmission of epidemiologically important microorganisms by direct (skin to skin) or indirect contact such as might occur with patient care activities, performing phlebotomy, etc. Indirect-contact transmission involves contact of a susceptible host with a contaminated intermediate object, usually inanimate, in the patient’s environment. Contact Precautions apply to specified patients known or suspected to be infected or colonized with epidemiologically important microorganisms than can be transmitted by direct or indirect contact. PPE - gloves and gown are required, but masks are not. Wash hands.

Transmission - Based Precautions may be combined for diseases that have multiple routes of transmission. When used either singularly or in combination, they are to be used in addition to Standard Precautions. Articles from the patient’s room (gloves, gowns and masks, etc.) must be appropriately disposed of before leaving the isolation area. Blood and other specimens must be transported in properly prepared isolation bags and handled cautiously.

Protective or Reverse Isolation
An increasing number of patients have compromised immune systems and are highly susceptible to infection. They often need to be protected from the everyday bio-hazardous threats of the external environment. For some, a private room and good hand washing techniques by all who enter, would be sufficient but more serious precautions such as sterile gown, gloves, and masks may be required. Articles entering the room must be sterile or carefully decontaminated. Since the patient is not infectious, articles from the room may be removed without special procedures.

Barrier Protection
Barrier precautions sometimes referred to as Personal Protective Equipment or PPE, include; medical grade gloves, goggles, face shields, fluid resistant laboratory coats/gowns, and shoe covers. It is not necessary to use all precautions at all times, but the laboratory worker must use good judgment and assess which protective devices are required for the particular situation. Minimum protection is provided by use of gloves, goggles, and laboratory coat/gown to protect skin and clothing. The laboratory worker must monitor the work area constantly to be assured that no contamination of inanimate objects or other nearby workers can occur.

Biohazardous & Non-biohazardous Waste Disposal
Biohazardous waste must be disposed of in a manner to render it no longer hazardous. The materials must be placed into properly labeled containers which will then either be autoclaved and incinerated or sent to a licensed disposal service. Disposing of biohazardous materials is expensive and most facilities have strict guidelines on what is and is not to be placed into ‘biohazard’ waste cans. General rules: tubes and other containers of blood, papers or other materials that contain significant amounts (> 1 inch diameter on paper or ½ mL total) of blood, and used culture plates should be disposed of in bio-waste. Paper towels, used gloves (including those with few small spots of blood), and Kimwipe are not considered bio-hazardous and should be placed into regular trash. If needed, consult with your MLAB instructor for guidance regarding whether a particular item should be placed in bio-trash.

Chemical Hazards
Chemicals found throughout the laboratory may be hazardous with exposure. Chemicals may be corrosive, flammable, explosive, or cause skin and eye burns and irritation. Every effort must be made to minimize the opportunity for laboratory chemicals to be hazardous. Laboratory chemicals must be appropriately labeled under appropriate storage conditions.
The National Fire Protection Association (NFPA) developed a standardized labeling system for hazardous chemicals. The system uses a diamond-shaped symbol, four colored quadrants, and a hazard rating scale of 0 to 4, with 4 being the highest rating indicating the greatest hazard.

1. The health hazard is shown in the blue quadrant (left side).
2. The flammability hazard is shown in the red quadrant (upper).
3. The instability hazard is indicated in the yellow quadrant (right).
4. The specific hazard is shown in the white quadrant (lower).

Only very small amounts of chemicals are routinely used in the urinalysis laboratory.

**Other Types of Laboratory Hazards**

Examples of other possible laboratory hazards include:

- Physical hazards: Heating devices, noise, projectiles, fire, cold, etc.
- Ergonomic factors: Standing, repetitive motion
- Mechanical hazards: Moving machinery such as centrifuges
- Sharps hazards: broken glassware, needles, etc.
- Electrical hazards: Fire and shock
- Radiation hazards: Ionizing and non-ionizing radiation
- Chemical hazards: acids, bases, reagents, toxins
- Fire / explosive hazards: flammable chemicals
- Biological hazards: Microbes, animals, plants, and genetically modified agents
- Airborne hazardous materials: (could present physical, chemical or biological risks) Vapors, dust, etc.

The workplace must be constantly monitored to reduce or eliminate the threat presented by these potential hazards.

**SDS Right to Know**

The Hazard Communication Standard (aka ‘Right-to-Know’ law) took effect in early 1980’s. The purpose of this law is to ensure that chemical hazards in the workplace are identified and evaluated and that information concerning any associated hazard is communicated to employees, workers, (and students). As a result, Safety Data Sheets (SDS) have been developed to outline the risk factor(s) associated with chemicals. Note: Safety Data Sheets (SDS) were formerly called Material Safety Data Sheets (MSDS); some literature and information sources may still use this old terminology.

**Hospital/ Healthcare Acquired Infections (HAI)**

Hospital/Healthcare Acquired Infections (HAI) were previously known as nosocomial infections. They are infections that are acquired by a patient after they are admitted to a health care facility. Approximately 5 - 10 percent of hospitalized patients in the United States acquire HAI/nosocomial infections. For the year 2002, the Centers for Disease Control (CDC) estimated 1.7 million HAI's occurred in US hospitals and were associated with 99,000 deaths. The cost in resources for HAI's annually is in the billions of dollars.

Factors that contribute to the prevalence of these often deadly infections include:

1. high prevalence of pathogens in the healthcare environment,
2. increased compromised patient populations in the hospital / healthcare environment, and
3. an efficient mechanism of transmission of organisms from patient to patient (also known as the ‘chain of transmission’)

*Frequent, proper hand washing is the single best way to prevent the spread of infection.*

**PPE Gloves**

Medical grade latex, or nitrile gloves are a critical part of the personal protective equipment (PPE) routinely used in the clinical laboratory. While most laboratory personnel wear gloves continuously throughout the day, it is critical that gloves be worn whenever there is any chance of coming in contact with tissue, blood or other body fluids.
Things to know and remember about gloves

1. **Always use medical grade gloves.** US Food and Drug Administration (FDA) regulates medical gloves and has specific requirements about how they're manufactured and used. The FDA's standards generally relate to strength, length, width, elasticity and freedom from pin holes. Based on their guidelines, medical gloves generally should be watertight and have consistent sizing and fit comfortably.

2. **Choose the right glove** for you and the activity you are performing.
   a. **Type of Materials.** Latex and nitrile gloves are recommended for high-risk situations involving potential pathogen exposure, such as phlebotomy procedures and when handing potentially infectious materials. Latex gloves are very common in the clinical laboratory. They come in a wide variety of sizes and provide protection as well as good dexterity. Nitrile gloves are also a comfortable option because of their softness and flexibility, although they tend to be stiffer than latex. Nitrile is also very strong and resistant to solvents, and they cause less irritation. Vinyl gloves are naturally soft and comfortable, but provide a looser fit and are only suitable for lower risk situations or for short periods.
   b. **Size and Comfort.** In addition to providing barrier protection, medical gloves should also offer comfort. Gloves that fit comfortably and properly can improve performance and reduce hand fatigue. Choosing the correct size is very important. Finding your right size is often a matter of trial and error. Keep in mind that size may vary slightly from manufacturer to manufacturer.

3. **Cost Considerations.** Cost is another issue of major concern when selecting medical gloves. Latex and vinyl gloves are generally very affordable. Nitrile and other types of synthetic gloves are usually more costly. Choosing the cheapest medical glove may not be best for your situation, yet more expensive products may not fit your budget. The best approach is to choose the highest quality medical glove that fits your needs at the best value.

4. **Always apply gloves to clean smooth hands.**
   a. Dirty or oily hands may compromise the integrity of the glove, leaving you without the level of protection you are depending on.
   b. While it is advisable to **wash your hands** before putting your gloves on, be sure your hands are well dried before donning the gloves. Any residual wetness will make the glove application much more difficult leading to possible micro-tears - compromising the protection that the glove is supposed to provide.
   c. Keep hand, ring and finger jewelry to a minimum to prevent tearing the glove or reducing its effectiveness.
   d. Glove application: Roll the glove cuff down and slip the glove onto the fingers. Slide the glove up to cover the palm area of the hand. Pull the cuff up and over the cuff of the lab coat.

5. **Removing the dirty/contaminated glove.**
   It doesn't matter which glove, right hand or left is removed first. For the purposes of discussion, let's say we use the right hand to remove the left hand's glove.
   a. Use the right hand's thumb and forefinger of one hand to 'pinch' the glove palm of the left hand.
   b. Pull the glove forward - toward the fingertips - until it comes off.
   c. While continuing to hold the dirty glove in the right hand, slide the now bare left hand's fingers forward under the right hand's cuff and up to the right palm.
   d. Pull the right hand's glove off by turning it inside out. Dispose of the glove appropriately. (If the gloves are not heavily soiled with blood, they go into regular trash. If blood soiled, put them into Bio-Trash.)
Handwashing: a critical step in infection control
Hands should be washed at the following times:
1. when visibly contaminated with blood, body fluids, or tissues,
2. after every patient contact,
3. after removal of gloves and other protective wear or equipment,
4. before eating, drinking, smoking, applying makeup, or adjusting contact lenses, and after using the restroom facilities,
5. before all other activities that entail hand contact with mucous membranes or a break in the skin,
6. periodically during the day when routinely handling and testing bloody fluid, AND
7. any time you leave the laboratory area.

Action of properly performed hand-washing.
1. Soap removes oils that may hold bacteria to the skin.
2. Warm running water washes away loosened debris and lathers the soap.
3. Friction of the hand rubbing loosens and removes dead skin, oil and microorganisms.
4. If performed correctly, usually removes potential pathogens.
5. Important: After rinsing, the faucet should be turned off using paper towels so as to avoid re-inoculation of microorganisms onto the hands.

Quality Control in the UA Lab
Quality Control measures have long been used in the clinical laboratory as a means of assuring that all patient test results are accurate and acceptable for reporting to the physician. In the past the laboratory’s focus has always been on maintaining control of the actual performance of the test and providing accurate results. In the broader picture, the actual testing process is only part of the over-all process of ensuring accuracy of test results. The process of Quality Assurance is a comprehensive system monitoring the accuracy of test results where all steps before, during and after the testing process is considered. Pre-analytical variables, such as whether the patient is/is not fasting, can have tremendous effect on the test results. Analytical variables include the conditions under which the test is performed (traditionally the major focus of laboratory QC testing). Post analytical variables include the means of transmitting the results and clerical accuracy of the test report. All the phases of the testing process are subject to errors and must be closely monitored.

Semi-quantitative chemical testing of urine is done using a reagent strip. In order to be assured that these strips are providing correct information, control samples with pre-determined or known values are tested in parallel and under the same conditions as are patient samples. The reagent strip is dipped into the prepared control sample(s), incubated the appropriate amount of time and read in the same way that any patient sample would be tested. If the results of the reagent strip results do not match with the expected results of the control, patient results may not be released until the discrepancy is cleared. Most labs today purchase pooled urine quality control specimens with known results. These controls may come lyophilized (freeze-dried) and need to be reconstituted or may be supplied in the liquid state. Generally two levels of control are tested. One level, often called the ‘normal control’ gives results that are in the normal range expected of clinically normal patients. The other control, the ‘abnormal’, will produce results outside the normal range expected. It is important that each control is tested under the exact same conditions as are patient samples and that all results are recorded.

The frequency of QC testing varies between labs. Some will test with each batch of patients, while others may test but once per shift. QC testing must also be performed every time a new lot number of dipsticks are put into service.

The results of the QC dipstick testing must be immediately compared to the expected results provided by the manufacturer. If any parameter (individual test) is outside the expected result, the patient test results cannot be released. If multiple controls (i.e. both control levels) are used, all parameters must be ‘in control’ before patient results can be released.

MLAB 1311 UA/BF Laboratory Exercise 1
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Accredited laboratories must participate in an external quality control process whereby they receive survey samples, perform the requested tests and send results to the external agency. Their results are compared to other participating laboratories. In internal quality control procedures the focus is on the single laboratory and how individuals at the one lab compare.

**Urine Specimen Collection**

Collection of a proper urine specimen is very important to the quality and usefulness of the test results. Patient preparation, timing, proper container, and correct method of preserving/storing the specimen are critical to the integrity of the specimen.

The **random urine** specimen is the most common and easiest to collect. This type of specimen is appropriate for routine UA. It is collected at any time of the day and does not require any special instructions or preparations.

A **first morning specimen** is the most concentrated specimen and therefore most likely to demonstrate abnormal chemistry results. The only requirement is to be collected immediately upon rising and before any food or drink is consumed. It may be necessary to verify that the patient has not eaten or drank any fluids during the night. Another term that may be used with this specimen is **fasting** urine.

The **mid-stream urine specimen** may also be classified as ‘random’ or ‘first morning’. To qualify for a mid-stream specimen, the patient must begin the voiding process into the toilet, then capture some of the flowing specimen into the container. When an adequate amount of urine is collected, the patient continues to empty the bladder again into the toilet. The mid-stream urine collection is most often combined with **‘clean catch’** where prior to voiding, the patient uses mild antimicrobial soap to clean the external genitalia of microorganisms. This combination of ‘clean catch’ and ‘mid-stream’, results in the preferred sample for urine microbiology studies. Patient instructions for special urine collections should be given in writing and reviewed verbally prior to collection. If the patient’s first language is not English, every effort should be made to provide them written instructions in their native language.

The **timed urine specimen** may be either a specimen collected at a specified time or over a period of time. A ‘fasting urine’ is an example of a specimen that is collected at a specific time, when they are still in the fasting state which is @ 8 or more hours since their last meal (usually first sample of the morning).

Quantitative Urine Total Protein, Urine Metanephrines, VMA, Quantitative Urobilinogen, and urine creatinine are examples of urine chemistry tests that require the collection of a ‘timed’ urine sample. A 24 hour collection is the most common ‘timed’ urine sample, but other collections may be ordered.

At the beginning of any ‘timed’ specimen collection, the patient must empty their bladder of all urine - and flush the sample away. A note of the time of day should be recorded. Here are some examples of collection of ‘timed’ urine specimens:

- **2 hour collection for urobilinogen**
  (This test requires a 2 hour urine collection that must take place in the early afternoon, 1pm-3pm or 2pm-4pm.)
  1. At 1 PM patient voids all urine in bladder and flushes it away.
  2. At exactly 3 PM have patient void all urine from the bladder into the proper container, label appropriately, place in dark paper sack and transport to lab immediately.
  Note: if patient absolutely must void in between the 1 pm and 3 pm times, all urine voided must be collected and combined with the 3 pm collection prior to sending to lab. Keep the specimen in dark refrigerator.

- **12 hour collection for creatinine**
  (This test is most frequently performed on a 24 hour sample, but 4 hour and 12 hour collections are also seen.)
  1. At start time, patient voids all urine in bladder; this specimen must be flushed away.
  Note exact time on requisition.
2. During the next 12 hours have patient void all urine from the bladder into the proper container. Keep container in dark refrigerator.
3. Exactly 12 hours later, have patient completely empty bladder, placing all this urine in the container.
4. Label container appropriately, and transport to lab immediately

PROCEDURE 1 - Safety Tour, Floor Plan & Escape Route (10 points)

1. Stow away any unnecessary materials to prevent accidental contamination.
2. Take an instructor guided tour the MLAB/BITC laboratory and prep areas.
3. On a sheet of paper, sketch-out the basic floor plan noting the location of
   * all fire extinguishers
   * fire blankets
   * eyewash stations
   * fire escape exit/route(s)
4. On a separate piece of paper, prepare a floor plan of the laboratory and prep areas by refining your original drawing. Include in your plan, an evacuation route in case of fire or other dangerous event.
   Include the rally point destination outside of the building and how you intend to make sure all your classmates are also safely out.
   Hand drawn floor plans, in ink, are acceptable. The drawing must include labeled location of safety equipment. Only complete neat drawings will be awarded full credit.

PROCEDURE 2 - Chemical Safety, NFPA Identification of Lab Hazards (5 points)

1. During your tour of the MLAB/BITC laboratory and prep areas, note at least two (2) chemicals with NFPA designation posted on them.
2. List the chemicals along with the NFPA hazard identification information (Health, Flammable, Reactive, and other) and what each designation means for the specific chemical. Following the example provided, place the information in the table provided on the report sheet.

PROCEDURE 3 - Chemical Safety, Safety Data Sheets (10 points)

1. Using Google, or other search engine, search for free SDS sheets (example site - VWR: https://us.vwr.com/store/search/searchMSDS.jsp?tabId=msdsSearch).
2. Select (1) of the chemicals (not water) identified in Procedure 2 and locate an internet SDS sheet for it. Print the SDS sheet.
3. Fill out the report form provided and answer any associated questions. Be sure to attach the SDS sheet and indicate where it was located.

PROCEDURE 4 - Removal of Soiled Gloves (5 points)

1. Working with a lab partner, apply a pair of appropriately fitting medical grade gloves. (In this lab only, it is permissible for both lab partners to use the same pair of gloves, if they fit both members appropriately.) Students are allowed 2 practice sessions, if needed, before grading begins.
2. Removal of soiled gloves must be done in a manner to avoid contamination of the skin or other surfaces. Instructor to demonstrate.
3. The following steps should be routinely practiced.
   a. With the thumb and index finger of one hand, pull the top of the glove on the opposite hand down so that it is removed by turning it inside out. Be careful not to touch the skin on the wrist area above the top of the glove.
   b. Place that glove into the palm of the hand which is still gloved and close that hand.
   c. Using the glove-free hand, slide the fingers down the wrist of the gloved hand such that it begins to push the glove off that hand.
d. What should be exposed is the inside of the second glove removed. The first glove should be inside the second glove.

e. Since these gloves do not contain significant visible blood, they are put into regular trash.

4. Have lab partner sign your papers.

PROCEDURE 5 - Handwashing (5 points)
1. (Continue working in pairs) Materials needed: sink & running water, antibacterial soap, & paper towels.
2. Make sure there are clean paper towels available and ready to use.
3. Turn on the water faucet and adjust temperature.
4. Dispense @ ½ to 1 mL antibacterial soap into the palm of the hand.
5. Vigorously lather hands and rub together for at least 15 seconds.
6. Wash well between fingers, paying special attention to the fingernails and nail beds, and up the wrists.
7. Being careful not to touch sides of the sink with your hands, rinse well with a moderate stream of water in a downward motion.
8. Use paper toweling to thoroughly dry the hands.
9. Using the same piece of paper towel, turn off the water. DO NOT touch the faucet handle with your hands once they have been washed.
10. Dispose of paper toweling in regular trash.
11. Have lab partner sign your papers.

Lab partners/observers, complete the papers after the student has correctly fulfilled the steps.
Laboratory Exercise #1: Report Sheet

Student Name __________________________ Date _________________ ___ / 35 points

PROCEDURE 1 - Safety Tour, Floor Plan & Escape Route

(10 pts)
A. Labeled Floor Plan. Following the instructions provided for Procedure 1, prepare a drawing of the floor plan and prep area(s) for the MLT laboratory at your campus. Hand drawn floor plans, in ink, are acceptable. The drawing must include the labeled location of safety equipment. Only the complete neat drawings will be awarded full credit.

B. Fire Escape Plan. List in step by step order how you would plan an escape from a fire or similar emergency in the MLAB / BITC laboratory. Maintaining the ‘group safety concept’, include how you would intend to make sure all of your classmates are also safely out. For purposes of consistency, plan your escape starting in the middle of the laboratory. As stated in the directions, put the Fire Escape Plan on the back side of the Labeled Floor Plan.

PROCEDURE 2 - Chemical Safety, NFPA Identification of Lab Hazards

(5 pts) List the two (2) chemicals along with the NFPA hazard identification information (Health, Flammable, Reactive, and other) and what each designation means for the specific chemical. Following the Example provided, place the information in the table.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>NFPA hazard ID information</th>
<th>What each means in respect to this chemical.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example Ethidium Bromide</td>
<td>Blue Health = 4</td>
<td>Blue Health = 4 (Extreme rating, poison, chronic exposure may cause heritable genetic damage.)</td>
</tr>
<tr>
<td></td>
<td>Red Flammability = 1</td>
<td>Red Flammability = 1 (Slight Risk)</td>
</tr>
<tr>
<td></td>
<td>Yellow Reactivity = 1</td>
<td>Yellow Reactivity = 1 (Slight Risk)</td>
</tr>
<tr>
<td></td>
<td>White (Contact Rating)=3</td>
<td>White (Contact Rating) =3 (Severe, Very toxic by inhalation. Inflames skin, irritates eyes.</td>
</tr>
</tbody>
</table>

Note: Procedure 3 report is on next page.

PROCEDURE 4 - Removal of Soiled Gloves

(5 pts) Remove soiled gloves in a manner to avoid contamination of the skin or other surfaces.

Key 5 pts= easy smooth glove removal with no possibility of contamination.
4 pts = while little to no possible contamination, needs to work on making process automatic
3 pts = even after a practice session, still quite awkward during the glove removal process; possibility of contamination of skin or surrounding articles is possible. Needs more practice.

PROCEDURE 5 - Handwashing

(5 pts) Washes hands according to the protocol provided.

Key 5 pts= follows all steps in protocol; including adjustment of water, dispensing a proper amount of soap and vigorously lathering and washing hands, in between fingers, under nails etc for 15 seconds. Rinses well and uses paper towel to dry hands as well as to turn faucet off.
4 pts = Under-performs one or more steps. Examples: improper adjustment of water./soap amount. Shortens or rushes through scrubbing time. Does not clean well between fingers or under nails. Uses paper towels to dry hands and turn off faucet.
3 pts = Omits one step or underperforms two or more steps.
1-2 pts = Omits more than one step or under performs all steps.
1. Identification
* should also include alternative names
* name of manufacturer / shipper
* basic contact information where a knowledgeable person can be reached

2. Hazards Identification
• provide a brief summary of hazards associated with the use and exposure to the chemical
• required label elements

3. Composition / information on ingredients
Includes information on chemical ingredients; trade secret claims.

4. First aid measures
first aid measures for anyone exposed to the material;
Includes important symptoms/ effects, acute, delayed; required treatment.

5. Fire fighting measures
provide brief summary of fire extinguishing media, special hazards presented / special protective equipment

6. Accidental release measures
procedures to follow should the chemical be released into the environment;
Personal precautions:
Environmental precautions:
Methods for cleaning:

7. Handling and Storage
List precautions for safe handling and storage, including incompatibilities.

8. Exposure Controls
lists OSHA’s Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE)

9. Physical and chemical properties
should consider:
Appearance: Odor: Boiling point: pH:
Melting point: Flashpoint: Explosive properties:
Vapor pressure: Relative density: Solubility:

10. Stability and reactivity
should consider: Conditions to avoid:
Materials to avoid:
Hazardous decomposition products:

11. Toxicological information
includes routes of exposure; related symptoms, acute and chronic effects;
numerical measures of toxicity.

12 Ecological information

13 Disposal considerations

14. Transport information

15. Regulatory information

16 Other information
Laboratory Exercise #1: Study Questions

Student Name ______________________ Date _________________ ___ / 24 points

Instructions: Answer the questions as appropriate. Unless otherwise stated, each question is worth one point. Unless otherwise stated by the instructor, Lab Study Questions are due by the end of the following lab period.

1. (6 pts) Complete the following chart of types of hazards, as presented in this laboratory and provide a laboratory-related example.

<table>
<thead>
<tr>
<th>Type of Hazard</th>
<th>Laboratory Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Hazard</td>
<td>Sulfosalicylic acid (as used in UA protein back-up testing)</td>
</tr>
<tr>
<td></td>
<td>(If possible site examples that may be found in a urinalysis laboratory setting.)</td>
</tr>
</tbody>
</table>

2. (2 pts) Give an example of a clinical laboratory biohazard (can be an object or a situation). State what you would do or how you would make it non-biohazardous.

<table>
<thead>
<tr>
<th>Example of laboratory biohazard</th>
<th>Your response and/how to make it non-biohazardous.</th>
</tr>
</thead>
</table>

(5 pts., ½ each)

3. Analyze Airborne Precautions, Droplet Precautions, Contact Precautions, Protective Isolation and Standard Precautions by completing the following table. (Note: table is continued on next page)

<table>
<thead>
<tr>
<th>Isolation type</th>
<th>Nature of infectious material.</th>
<th>Who is infectious?</th>
<th>Who must be protected?</th>
<th>What PPE measures are required?</th>
<th>Disposal of PPE?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Precautions</td>
<td>all patient materials considered infectious</td>
<td></td>
<td></td>
<td>At the least, gloves. Depending on situation, lab coat / gown and face/eye protection</td>
<td>visibly bloody or contaminated articles to bio-trash; otherwise normal disposal</td>
</tr>
<tr>
<td>Airborne Precautions</td>
<td>very small particles (measuring 5 μm or less); dispersed through air currents</td>
<td></td>
<td>all persons who are allowed to enter</td>
<td></td>
<td>after leaving the patient &amp; before returning to general area. Must wash hands.</td>
</tr>
<tr>
<td>Droplet Precautions</td>
<td>Infectious droplets larger than 5 μm. Droplets contact conjunctiva or mucous membranes often as result of sneezing, coughing etc.</td>
<td>pts infected with epidemiologically important pathogens that can be spread by droplets transmitted by sneezing, coughing etc.</td>
<td></td>
<td>after leaving the patient &amp; before returning to general area. Must wash hands.</td>
<td></td>
</tr>
</tbody>
</table>
5. (5 pts) Briefly describe how ‘Quality Assurance’ differs from ‘Quality Control’.

6. (2 points) You are reviewing the UA results of a lab assistant. You find that the bilirubin result on the quality control sample is lower than the manufacturer’s posted results. Your next step is to: (Choose the one best answer.)
   A. Call the QC sample manufacturer to inquire if there has been a change in the bilirubin expected result.
   B. Release patient test results of samples IF all other dipstick tests are normal, and ask the lab assistant if there was a possible recording error in the QC test.
   C. Release the test results for any out-patients, and then retest the QC sample yourself.
   D. Do not release patient results; check the shelf date of the dipsticks, repeat the QC check on fresh control(s).

7. (4 points) Give specific instructions for collecting a **24 hr. urine collection**. Start the collection at 8:00am.

1. 
2. 
3. 
4. 
5. Deliver the specimen to the laboratory as soon as possible.