Work Flow and Laboratory Design

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The project for work flow and laboratory design consists of three phases. These phases would be: (1) laboratory responsibility; (2) architectural and engineering responsibility; and (3) construction. This report will pay more attention to the functional narrative document and the initial schematic drawing, both of which are the phase 1 laboratory responsibility. The laboratory's functions and capabilities, as well as any potential staffing and/or equipment requirements necessary to ensure the laboratory's effectiveness and efficient workflow, would all be described in the functional narrative document. The initial schematic drawing would show the proposed laboratory layout as well as suggested measurements and sizes for significant components like sinks, counters, shelves, and equipment.

FUNCTIONAL NARRATIVE DOCUMENT

An area's purpose, functions, relationships, and activities are described in this document by the project design team, which was specifically created to give architects and engineers the knowledge they need to create formal plans and construction agreements. The functional narrative document must include specific detailed information about space, spatial relationships, utilities, ventilation, and other subjects. Each of these elements must be taken into consideration, whether they are arranged according to discipline (hematology, chemistry), or function (clerical, specimen processing, supply storage, waste disposal, personnel lounges). The necessary and desired elements for the laboratory design should be succinctly and clearly described in the functional narrative document.

SPECIMEN COLLECTION

A patient's health can be learned a lot from laboratory tests. The reliability of test results is necessary for making accurate treatment and diagnostic decisions. Accurate test results depend on proper patient preparation, specimen collection, and specimen handling. The integrity of the test specimens determines how accurate the results will be. A number of best practices must be

followed during the specimen collection and handling processes, including aseptic technique, appropriate specimen collection and transport containers, and timely transport of the specimen to the laboratory, in order to ensure specimen integrity. The specimen may become contaminated or degrade if any of these procedures are not carried out properly, making them all necessary for accurate test results.

I. Types of tasks and movements

A. Services

- Blood Extraction
- Other Body Fluids (Sputum, Stool, Urine, etc.)

B. Space

Blood collection areas must have the room, furnishings, and amenities necessary for the activity being performed. The space must include a work counter or tray, patient seating areas, and handwashing stations. The urine and feces specimen collection toilet must have a water closet, urinal, and/or restroom. This space may be outside the main clinical laboratory, a designated cubicle in a restroom, or a bathroom designated only for collecting specimens.

Area in square meters:

- Blood extraction should have a space of at least 6.00 m^2/chair or couch
- Specimen collection toilet for stool and urine should have a space of at least 1.67 m^2

II. Volume of Activities

A. Amount of traffic generated by the number of tasks

The task that was being done at the time would determine how crowded the specimen collection would be.

- The collection of samples by laboratory staff for transport to the clinical laboratory or requests for samples from patients would both contribute to this traffic. Because they may need to take blood samples from patients and transport them to a clinical laboratory for additional analysis, phlebotomists are an example of the traffic involved in specimen collection.
- The entrance to the clinical working area shouldn't be located right next to busy areas because this could result in unwelcome air currents that could damage equipment and

contaminate specimens. In order to prevent specimen contamination and damage to lab equipment, specimen collection areas should be strategically placed away from high traffic areas. Keeping specimen collection areas away from high traffic areas also helps to maintain the accuracy and validity of the specimens collected, as contamination can affect the results of analysis.

- Wet floors can create traffic because moisture on the floor may obstruct specimen collection loads and possibly harm lab equipment. In order to guarantee the accuracy of specimen collection, high traffic areas should also be kept tidy and free of trash. To prevent these problems, it is crucial to carefully plan the clinical working area's layout, positioning specimen collection areas away from busy areas and dry floors.

B. Supply Restocking

Making sure the laboratory has an adequate supply of supplies, including plastic disposable containers, lock containers, and other items, is required to do specimen collection. When handling potentially hazardous materials, staff members should also wear personal protective equipment like gloves, gowns, and masks.

- Disposable sample collection kit. Clinical specimens can be collected and transported in a secure and practical manner using the Disposable Sample Collection Kit. Each sample collection kit includes a biohazard bag, a transport tube with viral transport medium (VTM), and a sterile peel pouch containing a swab. Swab samples should be collected as soon as possible, put into the transport tube with the medium, and sent to the lab as soon as possible.
- Specimen container. Before collecting the sample, specimen containers should be labeled with the patient's name, the hospital's identification number, the date, and the time. The main container needs to be sealed with screws and put in a plastic bag. When collecting specimens, every effort should be made to prevent external contamination of the containers.
- Medical adhesive tape. Bandages, gauze, and other dressings are secured to the skin around wounds using medical adhesive tape. The majority of adhesive tapes are pressure-sensitive tapes, which adhere and remain in place when applied firmly. Neither a solvent nor heat activation are required. Various materials can be used to create medical adhesive tape, but most of them are breathable for comfort and usability.

C. Specimen Processing

The area of the laboratories where specimens are received, sorted, entered into the Laboratory Information System, labeled with barcoded labels, and processed is called Specimen Accessioning and Processing. A sample may be processed by being mixed to ensure that each

component is distributed equally throughout the sample or by being spun in a centrifuge to separate the red blood cells from the serum or plasma layer. Following the processing stage, the specimens are sent on to the various pathology and laboratory medicine divisions for testing. As a result, it is crucial that this laboratory area is well organized and well designed because it must ensure the efficient handling and processing of specimens. The following are steps to follow for a correct specimen processing:

- Proper patient identification. For the collection of blood or blood components, and other body fluids, use at least two patient identifiers. Get the patient's name before taking a sample. Verify armbands. The patient's full name, date of birth, or medical record number are all acceptable identifiers. To ensure precise identification, all specimen containers should be labeled in front of the patient.
- Utilize appropriate collection containers. While some analyses require preservative- and/or anticoagulant-containing containers, others do not. Using the incorrect container frequently produces inaccurate results. For precise specifications, refer to the test catalog.
- Deliver samples to the lab for analysis as soon as possible. Rapid separation from the blood cells is necessary for accurate measurement of analytes in serum or plasma. If analytes are not separated, they move between the cells, the plasma, and the serum, and glucose is consumed. While at room temperature, some analytes are unstable. Blood should never be drawn twice from patients and held in case additional tests are required at a later time. This practice can produce inaccurate results and should be avoided.

D. Communication Transaction

In this section, communication with patients, medical technologists, the front desk with the doctors and nurses, as well as other laboratory staff, is necessary to correctly identify the patient and the specimen that must be collected based on the tests required. To carry out a phlebotomy procedure correctly, communication between all of the aforementioned parties is required. Additionally, clear communication is necessary to guarantee that the appropriate PPE is used for each procedure and that the patient's data and specimen are properly documented. To ensure a safe procedure for the patient and healthcare provider, all parties involved in the communication process must maintain accuracy and precision.

E. Movement of People

Medical technologists and phlebotomists work well together. There is no conflict within the work area because the two lab spaces communicate and work well together. Phlebotomists and medical technologists can deliver superior patient care if they understand and respect one another's roles and duties. As a result of this collaboration, departments can communicate and share information more effectively, which is advantageous for both the patient and the healthcare team. Any

medical setting needs to function at this level of collaboration to give patients the best care possible. Together, the two lab spaces can offer a comprehensive and effective service.

III. Nature and Structure Needs

A. Power and Utilities

The clinical laboratory needs power and utilities because they supply the energy needed to run the lab's apparatus. The electrical equipment used in a clinical laboratory needs to be of the highest caliber, and it should be inspected frequently for signs of wear and damage. To avoid any potential shocks or fires, care should be taken to ensure that all electrical materials are installed correctly and earthed. Additionally, to ensure that all laboratory equipment is safe to use, qualified personnel should regularly inspect and test it. To protect both staff and patients, laboratory utilities should also undergo routine inspections to ensure they are up to code.

- Plumbing. Water must always be available in working and handwashing areas in a steady and adequate supply. Piping systems must be kept as hidden as possible, but they also need to be placed where maintenance and repairs can be done with little disruption to regular laboratory operations.
- Electricity. For all electrical and electronic devices to operate safely and effectively, electrical supplies must be of sufficient capacity and dependability. These materials include outlets, fuses, and cabling, all of which need to be earthed to avoid shocks in the event of a malfunction. The electrical supply needs to be reliable enough to support the used laboratory equipment.
- Ventilation. Each particular area of the clinical laboratory must have adequate ventilation and maintain the improved indoor air changes per hour.

B. Counter Space

It is essential to have enough room for specimen submission and collection. Health workers would be unable to benefit from the many technologies available for specimen collection and submission without sufficient laboratory space. For phlebotomy procedures, counter space should be set aside, as well as a comfortable area for collecting urine and stool samples and submitting them. In order for the clinical laboratory to achieve the efficient and effective performance of its activities and functions, adequate space or area must be provided for its various space/room necessities. Therefore, it is crucial to specify the counter space in order to decide what activities are appropriate for the space.

- The counter space should be about 30 inches.

- A stainless steel sink with a minimum 8" depth and a gooseneck faucet must be installed in certain areas of the clinical laboratory.

C. Protective Equipment

Personal protective equipment, or "PPE," is clothing worn to reduce exposure to risks that can result in serious workplace illnesses and injuries. Phlebotomy procedures also require the use of PPE because it helps safeguard the patient and the healthcare provider from any potential infectious diseases. All personal protective equipment must be designed and built safely, and it must be kept in a hygienic and dependable manner. It should be snug enough to encourage worker use.

- Laboratory coats (or other protective attire like aprons, scrubs, coveralls, etc.)
- Splash goggles or safety glasses
- Gloves that are suitable for the hazard
- Fully enclosed shoes

IV. Kinds of Instrument and Equipment

A. Glasswares

Glass is an inorganic, transparent, rigid, non-crystalline, and adaptable substance made of a mixture of metal oxides that have been fused at high temperatures. The glassware is well-known all over the world for its stability and inertness, stability and malleability, and malleability. The user can see a reaction happening inside thanks to the glass' transparency.

- Blood collection tubes. The majority of blood collection tubes contain an additive that either speeds up blood clotting (clot activator) or inhibits blood clotting (anticoagulant). After the blood has been separated by centrifugation, a tube containing an anticoagulant will yield a plasma sample, and a tube containing a clot activator will yield a serum sample. Some tests call for the use of serum, while others call for plasma, and still others call for anticoagulated whole blood.
- Blood culture bottle.

B. Plasticwares

Materials made of medical-grade plastic must adhere to international regulations. Polymers for medical devices are typically created from thermoplastic materials to guarantee the plastic's safety and efficacy.

- Sterile Urine Specimen Cup. The 90mL urine collection cup is made of sterile plastic, has a temperature strip, and a leak-proof lid. Testing on urine, blood, and semen samples is possible with this product. In order to collect and transport samples safely and accurately for medical diagnostic testing, the urine collection cup is crucial.
- Syringe. The tube with a plunger that typically connects to a needle. Fluid can be injected or removed using it. When you get a shot, the medication or vaccine is held in a syringe.

C. Refrigerator

Healthcare facilities and professionals store samples, specimens, vaccines, and medications in a laboratory refrigerator at a specific temperature to prevent spoilage. The tools and equipment used, along with the amount of work being done, will determine the size and structure. It is crucial to provide enough room for all required tools and supplies, as well as enough room for staff members to work securely and comfortably.

V. Communication Links

A. Telephone

Each piece of equipment needs to have a special label or identification. Each must maintain records and documents in a secure location that is also easily accessible to laboratory staff. All of the laboratory staff members' contact information should be included, as well as the address, telephone number, and/or e-mail address of the manufacturer. Telephones are frequently used to communicate both inside and outside of laboratories, including with other labs and healthcare providers. Telephone systems are frequently used in clinical laboratories to improve communication with staff, patients, and other relevant parties. Both mobile and VoIP phones as well as landline phones may be a part of these systems.

B. Intercom

The security and communication solution offered for medical contexts complies with all applicable rules and regulations. It offers direct multi-site communication to labs, blood banks, and other areas across facility complexes. Intercom lift stations and public address systems meet the needs of personal safety and public assistance. If the lab is a large facility, an intercom system might make it easier to communicate within it. To improve communication within the building, some laboratories may have intercom systems, especially in places where it might be challenging to use a phone or other electronic communication device.

C. Fax machine

PHI may be transmitted via fax machine as long as it complies with the institution's policies and procedures. Test results or other documents may be sent electronically by fax machines to other lab personnel or outside parties. The laboratory and other healthcare facilities or providers may send and receive documents via fax, such as test results or requisition forms.

VI. Number of Personnel and Staffing Pattern

The size and workload of the clinical laboratory will determine the number of employees and staffing patterns in the specimen collection area. Medical technologists and other support staff typically work in teams to collect specimens. These experts are in charge of gathering the specimen required for test performance, maintaining and configuring the apparatus, and guaranteeing the accuracy and dependability of the test results.

A. 24-hour coverage

Clinical laboratories frequently have 24-hour coverage, with staff members working in shifts to make sure that there is always someone on hand to conduct tests and address any issues that may arise. The quantity of work being done and the unique requirements of the laboratory will determine how many employees are working on each shift. When a need for specimen collection during the full 24 hours arises, a medical technologist must be on call at all times. As a result, this laboratory would require a minimum of three (3) medical technologists who are properly trained and skilled to perform and oversee specimen collection for the patients.

B. Number of person in each shift

The number of staff at any given time may also be influenced by the quantity of tests and procedures being performed, as well as by the complexity of the work. A laboratory that conducts numerous tests might require more personnel to be on call constantly to handle demand. However, the laboratory needs at least three (3) medical technologists on duty for specimen collection.

C. Support needs

In order to properly manage the specimen collection, a medical technologist may need the assistance of other medical staff. Simply because a particular medical technologist might be unable to properly collect the specimen required for diagnostic testing. The amount of support required for the tests and procedures may also have an impact on the necessary staffing.

VII. Supply Requirements

A clinical laboratory's efficient supply management is crucial to its efficient operation. The following aspects should be considered when determining supply needs in this kind of setting:

A. Requisitioning

The laboratory will require a procedure for ordering the supplies and reagents required to collect the specimen. It is crucial to have a system in place that makes it possible to acquire these materials quickly and effectively so that collection can be finished quickly. It is imperative to have systems in place to ensure that a steady supply of the reagents, consumables, and other supplies required for the collection and procedures carried out in the specimen collection area are kept on hand in the laboratory. It is crucial to have appropriate tracking systems in place that accurately document the amount of inventory available and a system in place to make sure the laboratory has enough supplies to operate.

B. Storage

The laboratory must have the necessary storage facilities for the supplies and reagents used there. For perishable items, this might include refrigerators and freezers, as well as shelves and countertops for other supplies. The storage spaces must always be kept tidy and arranged. In order for the staff to quickly locate supplies when needed, it is crucial to have proper labeling and tracking systems in place for all items. By making sure that all materials are stored correctly, the risk of contamination and deterioration can be reduced.

C. Dispensing

The laboratory will require a method for dispensing supplies and reagents as required for specimen collection. This could entail manually preparing and measuring materials or using automated dispensing systems. It's crucial to make sure that materials are dispersed precisely and in a way that reduces the possibility of mistakes or contamination. Automated dispensing systems can greatly lower the possibility of human error and increase accuracy..

VIII. Plans for the computer system (LIS)

A Laboratory Information System (LIS) can be used to manage and coordinate the specimen collection process in a clinical laboratory. The LIS can be used to track and manage the collection, transport, and processing of specimens, as well as to record and track patient

information and test orders. In general, the LIS is used to automate and streamline many of the tasks and processes involved in specimen collection, including:

- Receiving and processing test orders: The LIS can be used to receive and process test orders from healthcare providers, including requests for specific tests and any relevant patient information.
- Managing specimen collection: The LIS can be used to track and manage the collection of specimens, including the type of specimen, the location of the specimen, and any relevant instructions or information.
- Tracking specimens: The LIS can be used to track specimens as they are collected and transported to the laboratory, including the status of the specimen and any relevant notes or observations.
- Managing quality control: The LIS can be used to manage the quality control process for specimen collection, including tracking the performance of collectors and monitoring the quality of collected specimens.

A. Wiring

In general, the LIS will require connectivity to the laboratory's equipment, computers, and other devices, as well as the hospital's electronic medical record (EMR) system and any other systems that the LIS will be integrated with. This may require a combination of wired and wireless connections, depending on the specific needs and requirements of the laboratory. To connect the various components of the LIS, it may be necessary to install network cables, switches, routers, and other networking equipment. The specific wiring requirements will depend on the size and complexity of the laboratory, as well as the number and types of devices that need to be connected. It is important to have a well-planned and organized wiring scheme in place to ensure that the LIS is able to function efficiently and effectively. This may require the assistance of a qualified and experienced IT professional, who can design and implement a suitable wiring plan for the laboratory.

B. Location of the central processing unit and terminals

The central processing unit (CPU) and terminals of a Laboratory Information System (LIS) for specimen collection in a clinical laboratory are typically located in the laboratory control room or a dedicated computer room. The CPU is the main computer that runs the LIS software and manages the various functions and processes of the system. It is typically a powerful computer with a fast processor and a large amount of memory, and is responsible for storing and processing all of the data and information that is generated by the laboratory. The terminals are the devices that are used to access and interact with the LIS. These may include desktop computers, laptops, or tablets, and are typically located in areas of the laboratory where they are

needed, such as the testing areas, the sample preparation area, and the laboratory control room. It is important to have a well-planned and organized layout that ensures that the LIS is easily accessible to all of the laboratory staff who need to use it. In addition, it is important to ensure that the LIS is located in a secure area to protect against unauthorized access and data breaches.

C. Outside linkage

A Laboratory Information System (LIS) for specimen collection in a clinical laboratory may be linked to a variety of external systems and sources of information. Some examples of outside linkages that an LIS may have include:

- Electronic Medical Record (EMR) system: The LIS may be integrated with the hospital's EMR system to exchange patient information and test orders. This allows healthcare providers to access test results and other laboratory data directly from the EMR system.
- External laboratories: The LIS may be linked to other laboratories, either within the same healthcare organization or at external institutions, to facilitate the exchange of test orders and results.
- Reference laboratories: The LIS may be linked to reference laboratories, which are specialized laboratories that provide specialized testing services or expertise. This allows the clinical laboratory to access additional resources and capabilities as needed.
- Vendor systems: The LIS may be linked to the systems of suppliers and vendors, such as those that provide reagents or other supplies, to manage inventory and orders.
- Quality assurance and regulatory agencies: The LIS may be linked to quality assurance and regulatory agencies, such as accrediting bodies or governmental agencies, to facilitate the submission of quality data and other reports.

The outside linkages of an LIS for specimen collection can help to improve the efficiency and effectiveness of the laboratory by allowing it to access and exchange information with a variety of external sources. This can help to ensure that specimens are collected, processed, and analyzed accurately and efficiently, and that relevant patient information is accurately and securely transmitted between the laboratory and other healthcare providers.

CLINICAL MICROSCOPY

The examination and analysis of specimens using microscopes and other specialized equipment takes place in a clinical microscopy section. Workers in this section prepare and stain specimens before examining them under different types of microscopes to identify structures or features. This section involves looking and examining substances at the cellular level such as non-blood body fluids.

IX. Types of tasks and movements

A. Services

The clinical microscopy section provides a variety of services, including routine and special tests on urine and fecal samples, such as:

- Urinalysis
- Pregnancy Test
- Fecalysis
- Semenalysis
- Fecal Occult Blood
- Urine Urobilinogen
- Urine Bile
- Urine Ketone
- Urine Micral

B. Space

The space required for clinical microscopy will vary depending on the facility's specifications and needs. This may include:

- Workstations (tables or countertops) for preparing and examining specimens.
- A separate space to view and interpret microscope images.
- A separate area for storing specimens.
- Storage areas to store equipment and supplies.
- Enough electrical outlets since microscopes and other equipment will need to be plugged in and powered in the clinical microscopy area.
- Enough space to accommodate the different types of microscopes.

X. Volume of Activities

A. Amount of traffic generated by the number of tasks

Numerous factors will affect how much traffic the tasks in a laboratory's clinical microscopy section produce because a clinical microscopy section that is managing a lot of tasks and specimens will often encounter more traffic than one that is handling less work. Staff members may need to move frequently about the section and regular interactions with other lab areas, clients, or patients from outside the lab.

It could be helpful to establish specific spaces for preparing, examining, and storing specimens in a clinical microscopy section to control traffic. Moreover, to make sure that staff members can effectively navigate the section, it is also vital to provide clear signs and other instructions.

B. Supply Restocking

In a laboratory's clinical microscopy section, a variety of supplies could be needed, including:

- Stains: These are substances used to highlight particular features within a sample, making them clearer to observe under a microscope.
- Microscope slides: Thin, flat pieces of glass or plastic that are used to hold samples for a microscope.
- Cover slips: Thin pieces of glass or plastic that are positioned over samples on microscope slides to hold them in place and protect them.
- Consumables: These are supplies used up or thrown away during testing.
- Reagents: These are chemicals used to perform or prepare samples for testing or analysis.
- Equipment and spare parts of microscopes: These are centrifuges, incubators, and Microscope lamps and lenses.

To make sure that the clinical microscopy area in the laboratory is adequately stocked with the supplies required to carry out the necessary tests, it is crucial to regularly check the inventory and restock as necessary of these supplies.

C. Specimen Processing

Specimen processing in the clinical microscopy section of a laboratory involves several steps, including:

- Collection: The collection of the sample is the first step in the processing of specimens. This could involve stools, urine, or semen.
- Receiving and labeling: The specimen is obtained from a patient or healthcare professional and is labeled with identifying information.
- Accessioning: The specimen is given a unique identifier, like a barcode, and is inputted into the computer system of the laboratory.
- Processing: The specimen is prepared for inspection by preparing slides, mounting specimen on slides, staining the slides as necessary, and carrying out any other tasks required to get the sample ready for examination.
- Analysis: A professional technologist or microscopist examines the prepared slides under a microscope.

- Reporting: The test results are recorded and reported to the patient or healthcare provider.

D. Communication Transaction

The clinical microscopy area of the laboratory can have more effective communication processes between physicians and patients as well as between patients and providers through online transactions, telephone, and other communication transactions. These communications could be about test results, how to deliver lab results to physician, and other things.

E. Movement of People

The general operations in the clinical microscopy area can be significantly impacted by the movement of people in the area. You can guarantee a secure and efficient laboratory environment in the clinical microscopy area by carefully managing the movement of workers and other people. There are several movements involved, such as regularly checking the inventory, getting test results, and restocking supplies.

XI. Nature and Structure Needs

A. Power

Some of the equipment that may be found in the clinical microscopy section of the laboratory that may need power include:

- Computers: These are used to run microcopy software and to store, display, manage, and analyze data produced by the lab, such as images of specimens captured under a microscope.
- Microscopes: These are instruments that are used to magnify and view samples in great detail or very high resolution.
- Incubators: It keeps the temperature and humidity constant for culturing or growing microorganisms.
- Freezers and refrigerators: In order to maintain the quality of the samples and reagents, refrigerators and freezers are utilized to preserve them at the proper temperature.

B. Utilities

To operate the clinical microscopy section, utilities are necessary services. These include:

- Electricity: In order to power the lab's equipment, electricity is necessary.

- Water: In the clinical microscopy section laboratory, water is required for a number of operations, such as sample preparation and surface or laboratory cleaning.
- Waste management: Clinical microscopy areas produce a variety of wastes, including hazardous and biohazardous waste. Systems must be in place for managing and disposing of these wastes.
- Ventilation: Proper ventilation is vital for maintaining a safe and productive environment in a laboratory.

C. Counter Space

The area must have work counters that have the appropriate height and width for the clinical microscopy section's equipment, instruments, and glassware.

D. Protective Equipment

The use of protective gear helps to protect lab workers from harm and avoid sample and equipment contamination. The following list includes some typical examples of safety gear that may be applied in the clinical microscopy section:

- Gloves: Gloves are worn to shield the hands from potentially harmful substances and to avoid sample contamination.
- Goggles: They are worn to shield the eyes from splashing and other potential dangers.
- Lab coats: Lab coats are used to shield exposed skin and clothing from splashes and spills as well as to avoid contaminating specimens.
- Face masks: Face masks can be worn to shield the face from harmful substances or to assist stop the spread of infection.
- Protective footwear: To protect the feet from spills and splashes, protective footwear such as closed-toe shoes may be worn.

It is crucial to check that all protective gear is available, in good working condition and that all staff members have received training on how to use it. Additionally, a working area exhaust fan is required to ensure adequate ventilation.

XII. Kinds of Instrument and Equipment

The following below are some of the equipment and instruments you could find in the clinical microscopy section:

- Microscopes: Light microscopes, electron microscopes, and other specialized microscopes are the main instruments used to examine biological specimens.

- Clinical centrifuge: A clinical centrifuge is a laboratory instrument used to separate different components of a sample according to their densities.
- Refractometer: Samples can be examined using a refractometer to determine their specific gravity, which is a measurement of the density of the sample in relation to water.
- Staining equipment: This includes racks, trays, and other instruments used to contrast or highlight particular specimen features to prepare specimens for microscopy.

XIII. Communication Links

A. Telephone

Telephones are utilized in the clinical microscopy sections to interact with other lab team members, healthcare providers, and other staff working at the healthcare facility.

B. Intercom

The microscopist and other lab or health professional members can communicate with each other using intercoms. The laboratory staff, who are continuously on the move can benefit from this, and for communication over greater distances, as well as settings when it may be hard to use electronic communication devices.

C. Fax machine

A fax machine can be employed to deliver documents to physicians or other healthcare providers, as well as to receive documents from other laboratories or healthcare facilities. Within the lab, using a fax machine can aid to increase accuracy and effectiveness communication.

XIV. Number of Personnel and Staffing Pattern

A. 24-hour coverage

Three registered medical technologists will cover the laboratory operations within 24 hours.

B. Number of person in each shift

At least one RMT will cover each shift, whether 8-hour or 12-hour shifts.

XV. Supply Requirements

A. Requisitioning

Requisitioning is also utilized in clinical microscopy to order materials and other materials required for efficient lab operation. In a clinical microscopy lab, some examples of the supplies that could be requested are as follows:

- Microscopes and other diagnostic tools: To complete their task, clinical microscopy laboratories often need a variety of diagnostic tools, such as microscopes and other specialized instruments. To make sure that the lab has the resources required to carry out its work, certain instruments might need to be requisitioned as needed.
- Reagents and other laboratory supplies: A range of reagents and other laboratory supplies are used by clinical microscopy laboratories to process and analyze samples. If necessary, these items might need to be requisitioned to make sure the laboratory has enough supplies on hand to complete its work.
- Consumables: Clinical microscopy labs may also need a variety of consumables, including pipette tips, slides, and other disposable materials. To make sure the lab has an adequate supply of these materials, these consumables may need to be requisitioned as needed.

In general, requisitioning is a crucial technique for clinical microscopy laboratories to make sure they have the materials and resources they require to complete their task efficiently.

B. Storage

Proper storage is important in clinical microscopy to ensure that specimens and slides are not damaged or degraded over time. Some general guidelines for storing specimens and slides used in clinical microscopy include:

- Store specimens and slides in a clean, dry, and well-ventilated environment.
- Avoid exposing specimens and slides to direct sunlight or other sources of heat or light.
- Store slides in a vertical position to prevent them from warping or breaking.
- Use slide boxes or cabinets to protect slides from dust and other contaminants.
- Store slides in a temperature-controlled environment. Depending on the type of specimen, the optimal storage temperature may vary. For example, some specimens may be sensitive to temperature changes and should be stored at a consistent temperature.
- If possible, store slides in a dark place or wrap them in foil or other light-blocking material to prevent fading or discoloration.

- Use a label maker or other labeling system to clearly mark slides with identification information, such as the date and time of preparation, the name of the preparer, and the type of specimen.
- Use caution when handling slides to prevent them from being damaged or contaminated. Use tweezers or other specialized tools to handle slides when necessary.

C. Dispensing

In clinical microscopy, dispensing refers to the process of preparing and presenting specimens for examination under the microscope. Dispensing may involve preparing slides, applying stains or dyes to the specimens, and ensuring that the specimens are properly labeled and stored. There are several factors to consider when dispensing specimens for clinical microscopy, including:

- Specimen type: Different types of specimens may require different preparation techniques and may be more or less suitable for examination under the microscope.
- Staining: Stains and dyes can be used to color and highlight specific structures or components within a specimen, making them easier to see under the microscope. It is important to choose the appropriate stain or dye for the specimen being examined and to follow proper staining techniques to avoid damaging or contaminating the specimen.
- Labeling: It is important to properly label specimens and slides with identification information, such as the date and time of preparation, the name of the preparer, and the type of specimen. This can help to ensure that specimens are properly tracked and that the results of the examination can be accurately recorded and interpreted.
- Safety: It is important to follow proper safety procedures when handling specimens and preparing slides to prevent contamination and protect laboratory personnel from potential hazards. This may include wearing personal protective equipment (PPE) such as gloves and lab coats, and following proper decontamination procedures

XVI. Plans for the computer system (LIS)

A computerized system called LIS, or Laboratory Information System, is used in a clinical context to handle and process laboratory data and findings. LIS is used in clinical microscopy to maintain and manage data regarding patient samples, test orders, and outcomes.

A. Wiring

Depending on the individual system being utilized and the sort of equipment it will be connected to, the wiring specifications for a LIS system in a clinical microscopy context will vary.

B. Location of the central processing unit and terminals

The central processing unit (CPU) manages how software instructions are interpreted and carried out. It ill be located in areas that are most efficient for wiring, and is least prone to spillages and other accidents that may damage the unit.

C. Outside linkage

The computer system in the microscopy section may also be connected to other systems from other laboratories or hospitals to improve information exchange. To do this, communication technologies such as the internet or specialized networks may need to be used to establish connectivity.

HEMATOLOGY

The Hematology section of the laboratory conducts routine and special tests on whole blood components. It utilizes blood and bone marrow samples to diagnose and track medical conditions. Some common tests in this section include blood typing, coagulation studies, blood cell morphology, and complete blood count (CBC). The volume of tests conducted may vary based on the number of patients who require them. In this section, cerebrospinal fluid (CSF) and other bodily fluids are also subjected to cell counts, differential counts, and other microscopic examinations.

XVII. Types of tasks and movements

A. Space

The hematology section will need space for:

- Workstations for preparing and analyzing samples
- Equipment for processing and analyzing samples, such as microscopes, cell counters, and centrifuges
- Storage for reagents and supplies
- Refrigeration for storing samples and reagents
- A sink for washing equipment and disposing of hazardous materials

The laboratory also dedicates areas for handling biohazards and storing hazardous chemicals. It is important to ensure that the space is appropriately sized and equipped to meet these needs.

B. Services

The various tests and procedures performed in a clinical laboratory will vary depending on the type and structural needs of the hematological sector. The following examinations and procedures may be carried out by a hematological laboratory:

- Complete blood count (CBC): This test measures the number and characteristics of different types of blood cells, including red blood cells, white blood cells, and platelets. The CBC can help diagnose a variety of medical conditions, including anemia, infections, and blood disorders.
- Blood typing: This test determines the type of blood an individual has based on their blood group antigens. Blood typing is important for transfusions and organ transplantation, as it helps ensure that the right type of blood is given to the patient.
- Coagulation studies: These tests measure how well the blood clots and can be used to diagnose and monitor bleeding disorders, such as hemophilia, or to evaluate the effectiveness of blood thinning medications.
- Blood cell morphology: This test examines the shape and size of blood cells to help diagnose a variety of medical conditions, including infections, anemias, and leukemia.

XVIII. Volume of Activities

A. Amount of traffic generated by the number of tasks

The amount of traffic generated by the tasks performed in this section will depend on the specific tasks being performed and the volume of samples being processed. Some factors that may affect the amount of traffic in the section include:

- The number of samples being processed: The more samples that are being analyzed, the more traffic there will be in the section.
- The complexity of the tests being performed: More complex tests may require more time and resources, leading to more traffic in the section. The number of staff working in the section:
- The more staff working in the section, the more traffic there may be as they move around and perform their tasks.
- The layout of the section: The layout of the section may also impact traffic flow, with some layouts allowing for more efficient movement of staff and samples.

It is assured that the amount of traffic in this laboratory is regulated through proper planning and organization which is regularly monitored through inspections and assessments.

B. Supply Restocking

Supply restocking ensures that the necessary materials and supplies are available when needed.

- Reagents: Reagents are chemicals used in laboratory tests to detect, measure, or prepare substances. These may include solutions for preparing blood samples or chemicals for performing specific tests.
- Consumables: Consumables are items that are used up during the course of a test or experiment, such as pipette tips, gloves, and filter paper.
- Equipment: There is a need to restock equipment such as centrifuges, microscopes, and cell counters to ensure that they are in good working order.
- Supplies: Other supplies that may need to be restocked in the hematology laboratory includes paper towels, cleaning solutions, and protective gear.

Restocking is done on a regular weekly basis to ensure that the laboratory has the necessary supplies and materials to perform its tasks.It is the responsibility of the laboratory staff to manage the restocking process, which involves ordering supplies, tracking inventory, and organizing storage.

C. Specimen Processing

Specimen processing refers to the steps taken to prepare blood and bone marrow samples for testing. This process involves several steps, which include:

- Collection: The sample is collected from the patient, typically through a blood draw or bone marrow aspiration.
- Transport: The sample is transported to the laboratory, either by the patient or a healthcare provider.
- Receiving: The sample is received in the laboratory and checked for proper identification and labeling.
- Accessioning: The sample is assigned a unique identification number and entered into the laboratory's database.
- Preparation: The sample is prepared for testing, which may involve centrifuging the sample to separate the different components of the blood or bone marrow.
- Analysis: The sample is analyzed using various techniques, such as microscopy or automated instruments, to measure the number and characteristics of different blood cells.

- Reporting: The results of the analysis are reported to the ordering healthcare provider, who will use the information to diagnose and treat the patient.

Specimen processing is an important part of the hematology section and requires careful attention to detail and strict adherence to laboratory protocols to ensure accurate and reliable results.

D. Communication Transaction

The quantity of information that a hematology lab may receive and send is substantial. As part of this, it can be necessary to exchange test findings with other sections or laboratories. It's critical that everyone participating in the communication transaction understands their duties and responsibilities and can communicate clearly with one another.

E. Movement of People

Due to the frequent arrivals and departures of employees, patients, and visitors, a hematology laboratory frequently experiences heavy foot traffic. In order to guarantee that the laboratory is available to anybody who needs to use it, it is imperative to manage this movement in a safe and effective manner. It is crucial to properly regulate human mobility inside the lab and have policies in place to direct it in order to guarantee its efficiency and safety.

XIX. Nature and Structure Needs

The various tests and procedures performed in a clinical laboratory will vary in cost depending on the type and structural needs of the hematology section.

A. Power

Some of the equipment that may be found in a Hematology laboratory and that may have specific power requirements include:

- Microscopes: Microscopes may require a power outlet to operate and may also have specific lighting requirements.
- Cell counters: These automated instruments may require a power outlet to operate and may also have specific temperature requirements.
- Centrifuges: Centrifuges may require a power outlet to operate and may have specific power requirements based on the size and capacity of the machine.
- Automated analyzers: These instruments may require a power outlet to operate and may have specific power requirements based on the size and capacity of the machine.

- Refrigerators: Refrigerators used for storing samples and reagents may require a power outlet to operate and may have specific power requirements based on the size and capacity of the machine.

It is important to ensure that the Hematology laboratory has access to sufficient power to meet the needs of the equipment being used and the volume of work being performed. This involves installing additional outlets or electrical circuits as needed.

B. Utilities

Utilities are essential services that are required to operate the hematology section. Necessary utilities include:

- Electricity: Electricity is needed to power equipment and lighting in the laboratory.
- Water: Water is needed for a variety of tasks in the laboratory, including preparing samples, washing equipment, and cleaning the laboratory.
- Gas: Gas may be used in the laboratory for heating or as a fuel for certain types of equipment.
- Ventilation: Proper ventilation is important in a laboratory to ensure that the air quality is safe and to reduce the risk of exposure to hazardous materials.
- Drainage: The laboratory will need a system for draining waste water and other liquids.

It is important to ensure that the Hematology laboratory has access to sufficient utilities to meet the needs of the equipment and the volume of work being performed. This may involve installing additional utilities or upgrading existing systems as needed.

C. Counter Space

The space must include work counters that are the right size and length to accommodate the necessary equipment, instruments, and glassware for the hematology section.

D. Protective Equipment

Protective equipment ensures the safety of those working in the laboratory and to prevent contamination of samples and equipment. Some common types of protective equipment that may be used in a Hematology laboratory include:

- Gloves: Gloves are worn to protect the hands from exposure to hazardous materials and to prevent contamination of samples.
- Goggles: Goggles are worn to protect the eyes from splashes and other potential hazards.

- Lab coats: Lab coats are worn to protect clothing from spills and splashes and to prevent contamination of samples.
- Face masks: Face masks may be worn to help prevent the spread of infection or to protect against exposure to hazardous materials.
- Protective footwear: Protective footwear, such as closed-toe shoes, may be worn to protect the feet from spills and splashes.

It is important to ensure that all necessary protective equipment is available and in good condition, and that all staff are trained in the proper use of this equipment. Proper ventilation through an exhaust fan must also be provided in the working area.

XX. Kinds of Instruments and Equipment

Some common types of instruments and equipment that may be found in a hematology laboratory include:

- Microscopes (Binocular Comound): Microscopes are used to examine blood and bone marrow samples at a high magnification to identify and characterize different types of cells.
- Cell counters: These automated instruments are used to count the number of different types of cells in a blood or bone marrow sample.
- Clinical Centrifuges (2,000 rpm). Centrifuges are used to separate the different components of blood or bone marrow samples by spinning the samples at high speeds. They are used for the separation of serum, urea, blood samples, and other routine applications in hospital and research laboratories.
- Automated analyzers: These instruments are used to analyze blood and bone marrow samples using automated techniques, such as flow cytometry or impedance technology.
- Strip Reader: The strip reader is an automated urine test strip analyzer. It is employed to analyze and present the test strip data.
- Refrigerators: Refrigerators may be used to store samples and reagents that need to be kept at specific temperatures.
- Incubators: Incubators may be used to culture cells or to maintain samples at specific temperatures.
- Glassware and Supplies This category comprises applicator sticks, slides, test tubes, cover slips, and test tube rack.

XXI. Communication Links

Effective communication is necessary to guarantee that test results and other important information are transmitted properly and on time.

- Telephone: Telephone systems are routinely utilized to enhance communication with staff, patients, and other stakeholders. These systems can support landlines, mobile, and VoIP phones in addition to mobile phones.
- Intercom: Intercom systems may be constructed to enhance staff communication, particularly in locations where utilizing a phone or other electronic communication device may be difficult.
- Fax machine: Other lab staff members or other parties may get test results or documents electronically using fax machines.
- LIS: A laboratory information system (LIS) is a computerized tool used to organize and keep track of all the many operations that take place in a lab, including test orders, results, and patient data. It could be connected to other systems, such the hospital's electronic medical record system, to make communication and data exchange easier.

XXII. Number of Personnel and Staffing Pattern

Medical technologists, medical laboratory technicians, and other support staff members including phlebotomists and laboratory assistants are frequently employed in hematology laboratories. The specific duties and responsibilities of these employees will change based on their level of education and training as well as the specialized requirements of the laboratory. It is crucial to take care of the support requirements of hematological laboratory specialists in addition to employment arrangements. This can entail offering enough training and resources, as well as making sure that the laboratory has all of the necessary tools and supplies to enable staff to carry out their duties effectively. Additionally, it is essential to have a secure and comfortable work environment that includes suitable personal protective equipment and hazard control procedures.

A. 24-hour coverage

Two medical technologists will cover the laboratory with a 24-hour coverage.

B. Number of personnel in each shift

Each shift will require two medical technologists and one hematologist. Laboratory assistants will be assigned depending on the requirements of the hematologist and medical technologists.

XXIII. Supply Requirements

In every section of a clinical laboratory, including hematology, supply management is crucial. To ensure that the laboratory has the necessary equipment and supplies on hand to conduct tests and procedures, it is crucial to carefully evaluate the following factors.

A. Requisitioning

The materials and supplies that will be needed in the lab must be planned for in advance, and orders for these goods must be placed as soon as feasible. This can require working with vendors to determine supply schedules and availability while also managing financial constraints.

B. Storage

To ensure their safety from danger or pollution, proper storage is essential. This can require keeping inventory records and keeping storage areas and containers for objects under control to keep track of their whereabouts and numbers.

C. Dispensing

Materials and supplies must be properly distributed to the necessary personnel or laboratory facilities after being delivered. This might mean giving materials to certain staff or keeping them in designated places. It is crucial to monitor how supplies and commodities are used in order to ensure their effective utilization and spot any potential shortages.

XXIV. Plans for the computer system (LIS)

A computerized system called LIS, or Laboratory Information System, is used in a clinical context to handle and process laboratory data and findings. LIS is used in hematology to maintain and manage data regarding patient samples, test orders, and outcomes.

A. Wiring

Depending on the individual system being utilized and the sort of equipment it will be connected to, the wiring specifications for a LIS system in a hematology context will vary.

B. Location of the central processing unit and terminals

The central processing unit (CPU) manages how software instructions are interpreted and carried out. It ill be located in areas that are most efficient for wiring, and is least prone to spillages and other accidents that may damage the unit.

C. Outside linkage

The computer system in the hematology section may also be connected to other systems from other laboratories or hospitals to improve information exchange. To do this, communication technologies such as the internet or specialized networks may need to be used to establish connectivity.

CLINICAL CHEMISTRY

Clinical chemistry is the biochemical examination of bodily fluids to aid in disease diagnosis and treatment. Chemical reactions are used in this type of testing to detect or quantify chemical components in physiological fluids. Clinical chemistry equipment enables the medical personnel to identify characteristics in tissues, blood, urine, stools, and even DNA that can allow them to identify the patient's issue and the most effective course of treatment.

XXV. Types of tasks and movements

A. Space

Clinical chemistry typically requires a laboratory space with a number of different areas and equipment. This may include:

- Sample preparation area: This area is used to process and prepare samples for analysis. It may include equipment such as centrifuges, pipettes, and benchtop incubators.
- Analytical area: This area is where samples are analyzed using various analytical instruments. These may include spectrophotometers, chromatographs, and immunoassay analyzers.
- Quality control area: This area is used to ensure the accuracy and precision of the analytical instruments and methods. It may include equipment such as reference materials and quality control samples.
- Storage area: This area is used to store chemicals, reagents, and other supplies needed for the laboratory.

- Workstation area: This area is where laboratory staff can work on computers, review results, and perform other tasks related to clinical chemistry testing.
- Waste disposal area: This area is used to safely dispose of hazardous materials, such as chemicals and biohazardous waste.
- Safety equipment: Clinical chemistry laboratories may also need to have safety equipment, such as eye wash stations, fire extinguishers, and spill kits, to ensure the safety of laboratory staff.

B. Services

Depending on the nature and structural requirements of the clinical chemistry section, different tests and methods carried out in a clinical laboratory would differ. A clinical chemistry laboratory may perform the following tests and procedures:

- Biochemical Analyses: These tests check the amounts of several compounds in bodily fluids, including enzymes, hormones, proteins, carbohydrates, and electrolytes (such as sodium and potassium). Diagnoses for ailments like diabetes, renal illness, and liver disease can be made with the aid of these tests.
- Toxicology Testing: The presence and concentration of drugs, chemicals, and other harmful compounds in bodily specimens are determined through toxicology tests. These tests are frequently used to look for drug misuse or assess the consequences of hazardous exposures.
- Therapeutic Drug Monitoring: Drug levels in the body are measured by therapeutic drug monitoring tests to make sure they are within the proper therapeutic range. The dosage and efficacy of drugs are optimized using these tests.
- Microbiology testing: These tests locate and describe microorganisms in bodily fluids and tissues, including bacteria, viruses, and fungi. These tests are used to identify illnesses and choose the best course of action.
- Genetic testing: These exams look for genetic variants or mutations that could be connected to particular inherited diseases or ailments. These tests are used to identify hereditary diseases including sickle cell anemia and cystic fibrosis and to provide individualized medical care.

XXVI. Volume of Activities

A. Amount of traffic generated by the number of tasks

The amount of traffic generated by the number of tasks in clinical chemistry depends on a number of factors, including the size of the laboratory, the volume of samples being processed, and the complexity of the tests being performed. In general, larger laboratories with higher

volumes of samples will tend to generate more traffic than smaller laboratories with lower volumes of samples.

There are several types of traffic that may be generated in a clinical chemistry laboratory:

- Physical traffic: This refers to the movement of people, equipment, and supplies within the laboratory. This may include activities such as collecting samples, preparing samples for analysis, and operating analytical instruments.
- Data traffic: This refers to the movement of data within the laboratory, such as results being transmitted from analytical instruments to computers or results being shared between laboratory staff.
- Sample traffic: This refers to the movement of samples within the laboratory, including the collection, preparation, and analysis of samples.

In order to manage the traffic generated by clinical chemistry tasks, it is important to have well-organized systems in place for the movement of people, equipment, and samples within the laboratory. This may include the use of designated areas for different tasks, clear signage to guide traffic flow, and effective communication between laboratory staff.

B. Supply Restocking

In order to ensure that the laboratory has the necessary supplies when they are needed, it is important to manage the restocking process effectively. This may involve maintaining accurate records of the supplies that are used in the laboratory, as well as the current levels of these supplies. It is also important to consider the lead time for ordering supplies, as well as the cost and quality of different options. Establishing procedures for ordering, receiving, and storing supplies, as well as for tracking the levels of supplies on hand, can help to ensure that the laboratory has the necessary supplies when they are needed and that restocking is done in a timely and efficient manner.

In a clinical chemistry laboratory, supplies refer to the materials, chemicals, and equipment that are needed to perform tests and analyze samples. These may include:

- Reagents: These are chemicals that are used to perform specific tests or reactions. Examples include enzymes, enzymes substrates, and buffers.
- Chemicals: These are substances that are used in the preparation and processing of samples. Examples include solvents, acids, and bases.
- Disposables: These are single-use items that are used in the laboratory, such as pipette tips, test tubes, and centrifuge tubes.

- Equipment: This may include instruments and equipment used in the laboratory, such as spectrophotometers, chromatographs, and incubators.
- Consumables: These are supplies that are used up during the course of testing, such as reagents, chemicals, and disposables.

C. Specimen Processing

Specimen processing in clinical chemistry refers to the steps involved in preparing a sample for analysis. This may include:

- Collection: The first step in specimen processing is to collect the sample. This may involve collecting a blood, urine, or other body fluid sample using appropriate techniques and equipment.
- Transport: The collected sample must then be transported to the laboratory for analysis. It is important to ensure that the sample is transported in a timely manner and that it is properly handled and stored to prevent contamination or degradation.
- Receiving: Upon arrival at the laboratory, the sample is checked in and logged into the laboratory's specimen tracking system.
- Preparation: The next step is to prepare the sample for analysis. This may involve centrifuging the sample to separate different components, adding reagents or other chemicals to the sample, or performing other preparatory steps as needed.
- Analysis: Once the sample is prepared, it is ready for analysis. This may involve running the sample through an analytical instrument, such as a spectrophotometer or chromatograph, or performing manual tests using specialized techniques and equipment.
- Reporting: After the sample has been analyzed, the results are reported to the requesting healthcare provider or individual.

It is important to follow proper procedures and guidelines for specimen processing in order to ensure the accuracy and reliability of the test results. This may include following good laboratory practices (GLPs) and using quality control measures to verify the accuracy of the results.

D. Communication Transaction

Effective communication is crucial in clinical chemistry, as it ensures that test results are accurately and efficiently transmitted to the appropriate individuals. Communication transactions in clinical chemistry may include ordering tests, receiving samples, performing tests, and reporting results. It is important to establish clear communication channels and protocols within the laboratory to facilitate this process.

E. Movement of People

In a clinical chemistry laboratory, the movement of people refers to the flow of laboratory staff and other individuals as they perform tasks and interact with each other. To ensure efficiency and safety in the laboratory, it is important to have a well-organized layout, carefully plan traffic patterns, and implement safety measures such as signage and emergency exits.

XXVII. Nature and Structure Needs

A. Power

There are many different types of equipment that may be used in a clinical chemistry laboratory, and many of these require electrical power in order to operate. Some examples of equipment that may need power in a clinical chemistry laboratory include:

- Analytical instruments: These may include spectrophotometers, chromatographs, and immunoassay analyzers, which are used to analyze samples.
- Centrifuges: These are used to separate different components of a sample by spinning it at high speeds.
- Incubators: These are used to maintain a specific temperature and humidity range for incubating samples.
- Pipettes: These are used to transfer precise volumes of liquids.
- Refrigerators and freezers: These are used to store samples and reagents at specific temperatures.
- Computers and other electronic equipment: These may include computers, printers, and other electronic devices used for data management and analysis.
- Lighting: The laboratory may require specialized lighting, such as UV lamps or fluorescent bulbs, for certain tasks.

It is important to ensure that all equipment is properly maintained and that it is used in accordance with the manufacturer's instructions in order to ensure the safety and reliability of the laboratory.

B. Utilities

There are a number of utilities in a clinical chemistry laboratory that may be required in order to support the functioning of the laboratory and the proper care of samples. These may include:

- Water: Water is typically used for a variety of purposes in the clinical chemistry laboratory, including preparing samples, cleaning equipment and surfaces, and running certain analytical instruments. It is important to ensure that the laboratory has a reliable source of clean water.
- Gas: Some laboratory equipment and instruments may require gas, such as compressed air or nitrogen, in order to operate. It is important to ensure that the laboratory has a reliable source of gas and that it is handled and stored safely.
- Waste management: Clinical chemistry laboratories generate various types of waste, including hazardous and biohazardous waste. It is important to have systems in place for the safe handling, storage, and disposal of these wastes.
- Temperature control: Some laboratory processes, such as incubating samples or storing certain materials, may require precise temperature control. It is important to have systems in place to maintain the appropriate temperature range within the laboratory.

By properly managing the utilities needs of the clinical chemistry laboratory, it is possible to support the functioning of the laboratory and ensure the proper care of samples.

C. Counter Space

Counter space is a valuable resource that is used for various tasks such as sample preparation, analysis, quality control, data management, and equipment storage. It is important to carefully plan the layout of the laboratory and allocate sufficient counter space for different activities, taking into consideration factors such as the size and number of samples being processed and the complexity of the tests being performed.

D. Protective Equipment

Protective equipment is used to minimize the risk of exposure to hazardous materials and to protect laboratory staff from potential injuries. This may include personal protective equipment (PPE) such as gloves, lab coats, safety goggles, and face masks, as well as safety glasses, lab coats, gloves, and face masks. It is important to use the appropriate protective equipment for the tasks being performed, follow proper procedures for donning, doffing, and disposing of protective equipment, and regularly inspect and maintain protective equipment to ensure that it is in good condition and functioning properly

XXVIII. Kinds of Instrument and Equipment

There are a wide variety of instruments and equipment that may be found in a clinical chemistry laboratory. Some of the most common ones include:

- Analyzers: These are automated machines that perform a variety of tests on samples, such as blood, urine, or other body fluids. Analyzers can measure levels of various substances, such as glucose, cholesterol, and electrolytes, and can perform many tests simultaneously.
- Microscopes: These instruments are used to view and analyze small samples, such as cells or tissue. Different types of microscopes are used for different purposes, such as viewing cells or analyzing chemical reactions.
- Centrifuges: These machines are used to separate different components of a sample by spinning it at high speeds. For example, a centrifuge can be used to separate cells from plasma in a blood sample.
- Incubators: These are temperature-controlled chambers used to grow or maintain cultures of microorganisms, such as bacteria or yeast.
- Balances: These are devices used to accurately measure the weight of small samples or substances. They are commonly used to measure reagents and other chemicals used in the laboratory.
- Ovens: These are used to dry or bake samples or materials, such as glassware or plasticware.
- Refrigerators and freezers: These are used to store samples and reagents at specific temperatures.
- Water baths: These are used to maintain samples or materials at a specific temperature during experiments or procedures.
- Pipettes: These are used to accurately measure and transfer small volumes of liquids.
- pH meters: These are used to measure the acidity or basicity of a solution.
- Glassware: This includes beakers, flasks, and test tubes, which are used to hold and mix samples.

XXIX. Communication Links

A. Telephone

Telephones are commonly used in clinical chemistry laboratories to communicate with other members of the laboratory team, as well as with healthcare providers and other staff within the healthcare facility. In addition to traditional landline phones, many clinical chemistry laboratories now also use cell phones or other mobile devices to communicate, as these can be more portable and allow for communication outside of the laboratory setting.

B. Intercom

Intercoms are commonly used in clinical chemistry laboratories to allow for communication between different areas within the laboratory. many clinical chemistry laboratories now also use digital intercoms, which can be more flexible and allow for communication over longer

distances. Some digital intercom systems also allow for the use of headsets or other portable devices, which can be useful for laboratory staff who are constantly on the move. Intercoms can be particularly useful in clinical chemistry laboratories because they allow for quick and easy communication without the need to physically walk to another part of the laboratory. This can be especially helpful when working with hazardous materials or when time is of the essence.

C. Fax machine

Fax machines are still used in many clinical chemistry laboratories, although they have become less common with the increased use of electronic communication methods. In a clinical chemistry laboratory, a fax machine may be used to send or receive documents such as test orders, results, or reports. Fax machines can be particularly useful for transmitting documents that need to be kept confidential or for sending documents to locations where there is no internet access. many clinical chemistry laboratories now also use online fax services, which allow for the transmission of faxes over the internet. These services often offer additional features such as the ability to store and organize faxes electronically, or to send and receive faxes from a computer or mobile device.

XXX. Number of Personnel and Staffing Pattern

The staffing pattern and number of personnel required in a clinical chemistry laboratory will depend on the size and complexity of the lab, as well as the volume and types of tests being performed. In general, a clinical chemistry laboratory that operates on a 24-hour basis will need a sufficient number of trained personnel to cover all shifts and ensure that the laboratory is able to function smoothly and efficiently.

A. 24-hour coverage
Three registered medical technologists will cover the laboratory operations within 24 hours.

B. Number of person in each shift
At least one RMT will cover each shift, whether 8-hour or 12-hour shifts.

XXXI. Supply Requirements

A. Requisitioning

Requisitioning refers to the process of ordering supplies or equipment that are needed for the laboratory to function properly. There are a number of factors that should be considered when requisitioning supplies in a clinical chemistry laboratory, including:

- Quantity: It is important to determine the correct quantity of supplies that are needed, taking into consideration factors such as the volume of tests being performed, the shelf life of the supplies, and the storage capacity of the laboratory.
- Quality: It is important to ensure that the supplies being ordered are of good quality and meet the specifications required for the tests being performed. This may involve verifying that the supplies meet appropriate standards and are from reputable manufacturers.
- Cost: The cost of supplies should be considered when requisitioning, as the laboratory may have budget constraints that need to be taken into account. It may be necessary to compare prices and negotiate with suppliers in order to obtain the best value for the laboratory.
- Lead time: The lead time for supplies, which is the time it takes for the supplies to be delivered after they are ordered, should be considered when requisitioning. It may be necessary to order supplies well in advance to ensure that they are available when needed.

By properly considering these factors when requisitioning supplies in a clinical chemistry laboratory, it is possible to ensure that the laboratory has the necessary resources to function properly and to provide reliable test results.

There are many different types of supplies that may be requisitioned in a clinical chemistry laboratory, depending on the specific needs and activities of the laboratory. Some examples of supplies that may be requisitioned in a clinical chemistry laboratory include:

- Reagents and chemicals: These are used to perform tests and analyze samples. Examples may include enzymes, buffers, and other chemicals used in various analytical techniques.
- Consumables: These are supplies that are used up during the course of testing and need to be replaced on a regular basis. Examples may include pipette tips, test tubes, and disposable gloves.
- Analytical instruments and equipment: These may include spectrophotometers, chromatographs, and other analytical instruments that are used to perform tests on samples.
- Laboratory supplies: These may include items such as pipettes, centrifuges, and other equipment used in the laboratory.
- Safety supplies: These may include items such as gloves, safety goggles, and face masks that are used to protect laboratory staff from hazardous materials.
- Reference materials: These may include standards and controls that are used to verify the accuracy of analytical instruments and to assess the quality of test results.

By requisitioning these and other supplies as needed, it is possible to ensure that the clinical chemistry laboratory has the resources it needs to function properly and to provide reliable test results.

B. Storage

It is important to properly store supplies in order to ensure their quality and stability, as well as to prevent contamination and to optimize space. Some factors to consider when storing supplies in a clinical chemistry laboratory include:

- Temperature: Many supplies, such as reagents and chemicals, are sensitive to temperature and must be stored at a specific temperature range in order to remain stable. It is important to store these supplies in a designated area with temperature control, such as a refrigerator or freezer.
- Humidity: Some supplies, such as certain reagents and chemicals, are sensitive to humidity and must be stored in a dry environment to remain stable. It is important to store these supplies in an area with low humidity, such as a desiccator or drying cabinet.
- Light: Some supplies, such as certain reagents and chemicals, are sensitive to light and must be stored in a dark environment in order to remain stable. It is important to store these supplies in a designated area that is protected from light.
- Contamination: It is important to store supplies in a way that minimizes the risk of contamination. This may involve storing supplies in designated areas or in containers that are specifically designed to prevent contamination.
- Labeling: It is important to clearly label all supplies, including the name of the product, the expiration date, and any special storage requirements. This will help to ensure that the correct supplies are being used and that they are being stored properly.

By properly storing supplies in a clinical chemistry laboratory, it is possible to ensure the quality and stability of the supplies and to prevent contamination.

C. Dispensing

Dispensing refers to the process of preparing and distributing reagents and other supplies that are needed for testing and analysis. There are a number of factors to consider when dispensing supplies in a clinical chemistry laboratory, including:

- Quantity: It is important to dispense the correct quantity of supplies, taking into consideration the volume of tests being performed and the specific needs of the laboratory.

- Quality: It is important to ensure that the supplies being dispensed are of good quality and meet the specifications required for the tests being performed. This may involve verifying that the supplies are from reputable manufacturers and are within their expiration date.
- Safety: It is important to follow proper safety protocols when dispensing supplies, including wearing appropriate personal protective equipment and handling hazardous materials safely.
- Documentation: It is important to keep accurate records of the supplies that are dispensed, including the quantity, quality, and expiration date of the supplies. This will help to ensure that the correct supplies are being used and that the laboratory has a clear record of its inventory.

By carefully considering these factors when dispensing supplies in a clinical chemistry laboratory, it is possible to ensure that the laboratory has the necessary resources to perform tests and to provide reliable test results.

XXXII. Plans for the computer system (LIS)

A computerized system called LIS, or Laboratory Information System, is used in a clinical context to handle and process laboratory data and findings. LIS is used in clinical chemistry to maintain and manage data regarding patient samples, test orders, and outcomes.

A. Wiring

Depending on the individual system being utilized and the sort of equipment it will be connected to, the wiring specifications for a LIS system in a clinical chemistry context will vary.

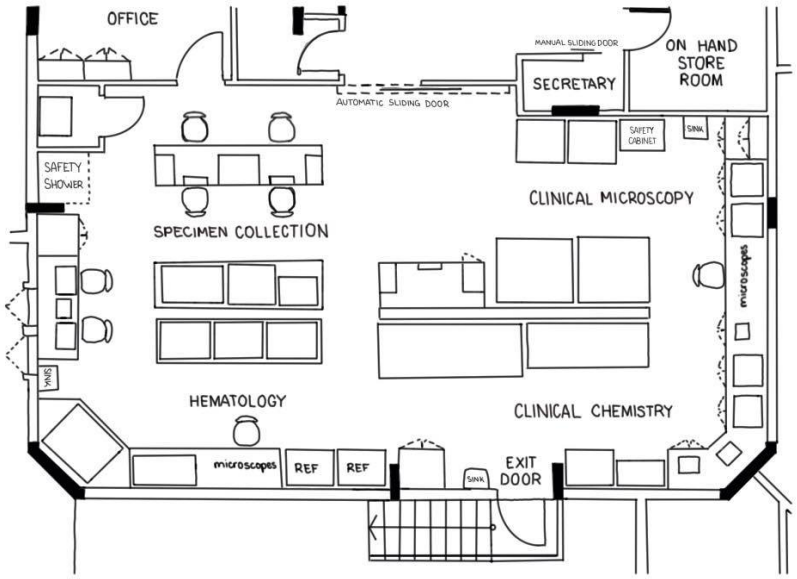
B. Location of the central processing unit and terminals

The central processing unit (CPU) manages how software instructions are interpreted and carried out. It ill be located in areas that are most efficient for wiring, and is least prone to spillages and other accidents that may damage the unit.

C. Outside linkage

The computer system in the clinical chemistry section may also be connected to other systems from other laboratories or hospitals to improve information exchange. To do this, communication technologies such as the internet or specialized networks may need to be used to establish connectivity.

INITIAL SCHEMATIC DRAWING



BLOCK 4

MT 23-AA