THE UNITED REPUBLIC OF TANZANIA

Ministry of Health

Practicum Guide

For Students

NTA level 5 Medical Laboratory Sciences

Developed on October, 2022

Published by the Ministry of Health

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List of Abbreviations

CCRP	Curriculum Cum Rotation Plan
CD	Cluster of Differentiation
CSF	Cerebrospinal Fluid
ICT	Information, Communication and Technology
IPC	Infection Prevention Control
I-TECH	International Training and Education Centre for Health.
COHAS	College of Health and Allied Sciences
MPS	Malaria Parasite Seen
MTUHA	Mfumo wa Taarifa za Usimamizi wa Huduma za Afya
NTA	National Technical Award
PESTEL	Political, Economic, Social, Technological, Environmental and Legal factor
PPE	Personal Protective Equipment
QMS	Quality Management System
RBC	Red Blood Cell
SOP	Standard Operating Procedure
SWOC	Strength, Weakness, Opportunity and Challenge
SWOT	Strength, Weakness, Opportunity and Threat
WBC	White Blood Cell
WHO	World Health Organization
ZN	Ziehl Neelsen stain

Background and Acknowledgement

This practicum guide for students has been developed following present medical laboratory sciences curricula to accommodate societal needs and new technological advancement in the diagnosis of diseases. The development process also addressed the challenges that have been encountered during the implementation of the former curricula so as to ensure smooth running of Education and Training in Health Training Institutions.

The development of this practicum guide for the Technician Certificate (NTA level 5) in Medical Laboratory Sciences is an outcome of collaborative efforts of the Ministry of Health (MoH), National Council for Technical and Vocational Education and Training (NACTVET) and tutors from various Health Training Institutions

I would like to appreciate in particular, the hard work of Mr. Innocent Chinguile and Dr. Joseph Mwabusila (the training coordinators of MoH) for their collaboration in thought and process to organize, coordinate and guide the development of this practical guide for students.

The MoH is also grateful to Mr. Manase Nsunza Principal Health Laboratory Scientist-Tutor Morogoro COHAS, Mr. Mzelifa Daud Principal Kolandoto college- Mwanza campus, Mr. Remelius Katalibahwa Karaba-Tutor

DECCA College of Health and Allied Sciences, Ms. Mwajuma Ibrahim – Tutor City COHAS, Ms. Irene F. Alex- Health Lab. Scientist MNH- Mloganzila, Mr. Byamungu Z. Petro Tutor- St. Francis University College of Health and Allied Sciences, Mr. Omary K. Michael- Tutor Tanga-COHAS, Ms. Esther Ngolo Nilla Tutor- Muhimbili-COHAS, Mr. Protas Bernard Mrosso- Tutor Mvumi Institute of Health Sciences, Mr. Godfrey R. Hongoli-Tutor Muhimbili University of Health and Allied Sciences, Mr. Brayson Mbwambo- Tutor Morogoro COHAS for their commendable work towards development of this Practicum guide for students.

I wish to extend my sincere gratitude to all those who actively took part in the practical practicum guide development for the betterment of health services in Tanzania.

Dr. Fadhili Mussa Lyimo

Assistant Director of Human Resources Development

Introduction to NTA Level 5 Practicum Guide

Overall Aim of the Practicum Guide

The practicum guide for students has been developed to guide students in the practical areas in transferring the theoretical knowledge into practice. It provides an opportunity for students to practice newly learned skills under the supervision and support of tutors and practical instructors.

This practicum guide provides guidance on required areas for rotation, specific skills to be learnt and tasks to be completed. Monitoring and evaluation methods and tools are also included.

This guide also attempts to promote standardization of the training in the Laboratory settings; to ensure that students in all Medical Laboratory Training Institutions have same competencies to be acquired for graduation.

Layout and Organization of the Practicum Guide

The practicum is organized into six major sections as follows:

Section I: Overview of the practicum which covers the overall aim of the practicum and definition of terms such as ‘practicum’, ‘Laboratory rotation’ and ‘field work’. The overview section also describes the structure,

practicum areas, prerequisite, advance preparation, monitoring and evaluation.

Section II: This section describes the laboratory practical teaching team which includes tutors, practical instructors and students. The section also covers roles and responsibilities of the team and addresses the patient/client as an important resource who plays a key role in the Laboratory practical learning of students.

Section III: This section explains practical competencies according to NTA level 5, summary of practical competencies, aims, practical learning objectives, practical opportunities and prerequisites.

Section IV: This section contains a summary of all the practicum modules and their allocated time per week, including specific guidance for NTA Level 5 Semester I practicum modules. Included in each module are the overall aim, learning objectives, competencies, practicum resources, prerequisites, practical placement, specific activities/assignments, end of practicum assignment, monitoring and evaluation, and checklists specific to each practicum module.

Section V: This section contains summary of all the practicum modules and their allocated time per week, including specific guidance for NTA level 5 semester II practicum modules. Included in each module are the overall aim, practical learning objectives, competencies,

practicum resources, prerequisites, practical placement, specific activities/assignments, end of practicum assignment, monitoring and evaluation, and checklists specific to each practicum module.

Who is the Practicum Guide For?

This practicum guide is intended primarily for use by students in the practical setting.

How Should the Practicum Guide be used?

The practicum guide is intended to be used as a tool by tutors, practical instructors and students to assist students to learn the appropriate skills as stipulated in the curriculum.

Each of these groups has specific responsibilities in using this practicum guide as follows:

Tutors responsibilities:

- Review the practicum guide to make themselves familiar with the layout and contents.
- Conduct a session to the students in class before going to the practical area or field work
- Go through the respective practicum module with students, covering practical learning objectives, competencies to be achieved and assignments to be done in the Laboratory setting to achieve the competencies.
- Go through the practicum guide with practical instructors emphasizing the roles and responsibilities of the teaching team.
- Collaborate with practical instructors to prepare all resources as indicated in the practicum resources section.
- Provide assignments to students as indicated within the practicum guide to reinforce learning process
- Utilize checklists to monitor and evaluate skills that students have acquired throughout the practicum.

Practical instructors' responsibilities

- Utilize the practicum guide to enable students learn the skills in the practical area and other placements.
- Collaborate with tutors to prepare all resources as indicated in the practicum resources section.
- Provide assignments to students as indicated within the practicum guide to reinforce learning process

- Utilize checklists to monitor and evaluate skills that students have acquired throughout the practicum.
- Sign practical procedure books and practicum guides

Monitoring and Evaluation

- The aim of monitoring and evaluation in this context is to monitor student progress in acquisition of skills.
- Monitoring and evaluation will be done using checklists and end of assignment reports.
- The checklist is a kind of task analysis describing what units of performance (step by step) are to be accomplished and the performance requirements associated with each step.
- The checklist determines whether students follow accepted steps in accomplishing required criteria (tasks/steps), how accurately they perform them, and in what sequence.
- Checklists shall be used to support the student to grow and develop towards desired levels of practical competence instead of using it as a formal assessment tool.

Practical Procedure Books

- You shall be provided with Practical Procedure Books at the beginning of the academic year. The Practicum Guide has been harmonised with the Practical Procedure Book as a guide for performing most of the procedures listed in the Practical Procedure Book. You are encouraged to practice skills at all the times in Laboratory settings and use both the Practical Procedure Book and Practicum Guide for the acquisition of skills.
- The tutor or a practical instructor assigned in signing your Practical Procedure Book shall only do so after being satisfied that you have been performing a task.

Section I: Overview of the Practicum

Overall Aim of Laboratory Practical Training

The overall aim of the training is to expose students to the entire range of activities in the health facility and field work. While rotating through different laboratory departments, students will acquire relevant skills to enable them to provide or participate in the delivery of services at their level. The laboratory training will be given over the entire instructional period of each semester.

The Purpose of the Practicum

The practicum is a practical attachment intended to give students opportunities for supervised practical hands-on application of theoretical concepts studied in class during the current or past semester. The practicum may be a brief activity or could last longer.

Laboratory Rotation/Placement

This is a form of practicum where students are attached to a health facility laboratory (Dispensary, Health Centre and Hospital) area for a specified period of time in order to learn the intended skills. At the site they have more interaction with patients and staff and have some responsibilities. During the Laboratory placement, responsibility for teaching lies on both practical instructors and tutors. The practical time has to be utilized appropriately through organization of classroom and

practical hours for students to have enough time for effective acquisition of skills.

Field Work

This is an off-college educational experience where students will be attached to District and Regional Referral Hospitals in small manageable groups for four (4) weeks duration. This normally involves placement to a selected hospital which should not be the one used for practical rotation. It is advised to send students to hospital where it is easy for tutors to supervise.

During field work students will be rotating in laboratory sections i.e. Phlebotomy, Parasitology, Clinical Chemistry, Microbiology, Serology, Haematology, blood Transfusion, Histology and Cytology and other related sections according to the level of the laboratory.

Field work aims to provide students with opportunities to work at the hospital setting so that they can gain experiences which elevate their competence and become more familiar with laboratory practices and challenges.

Structure of the Practicum Areas

During NTA Level 5, students will have 8 hours per week in the practical setting during semesters I and 13.5 hours per week during semester II. In order to successfully complete the practical training, students should demonstrate competencies in Laboratory logistics management, Maintenance and Calibration of Laboratory

Instruments and Equipment, Principles of Entrepreneurship, Laboratory Quality Assurance and Health Records Management for semester I. Haematology & Blood Transfusion, Medical Microbiology & Immunology, Clinical Chemistry, Medical Parasitology and Cytology & Histology for semester II.

Practicum Modules per Semester

- The following practicum modules are in NTA Level 5, Semester I:
  - MLT05101 Laboratory Logistics Management (20 Practical hours per semester)
  - MLT 05102 Maintenance and Calibration of Laboratory Instruments and Equipment (50 Practical hours per semester)
  - MLT05103 Principles of Entrepreneurship (40 Practical hours per semester)
  - MLT05104 Laboratory Quality Assurance (40 practical hours per semester)
  - MLT05105 Health Records Management (20 Practical hours per semester)

- The following practicum modules are in NTA level 5 semester II:
  - MLT 05207 Haematology and Blood Transfusion (60 practical hours per semester)
  - MLT 05208 Medical Microbiology and Immunology (70 Practical hours per semester)

- MLT 05209 Clinical Chemistry (60 Practical hours per semester)
- MLT 05210 Medical Parasitology (60 Practical hours per semester)
- MLT 05211 Cytology and Histology (20 Practical hours per semester)

Prerequisites

For this NTA level 5, students should have completed NTA level 4 modules and the required theoretical preparations in NTA level 5. These are discussed in the respective sections for each area of practice.

Practicum Resources

- Laboratory practical rotation plan
- Practicum Guide
- Practical Procedure Book
- Any other relevant resources

Advance Preparation

For all practical procedures, students shall be introduced to the skills in class rooms/ skills laboratory through demonstration

Practical Teaching

Tutors and practical instructors have the responsibility to supervise, guide and teach students in the laboratory setting. They also have responsibility of documenting student progress by making appropriate entries or

endorsing procedures completed in the students' Practical Procedure Books and relevant checklists. The roles and responsibilities of different staff in student learning are highlighted in section II of this practicum guide.

Monitoring and Evaluation

Students will be monitored and evaluated based on their performance of specific tasks using checklists and other tools. Tutors and practical instructors are encouraged to acquaint themselves with practical assessment and benchmarking criteria as stipulated in the NTA level 5 Curriculum.

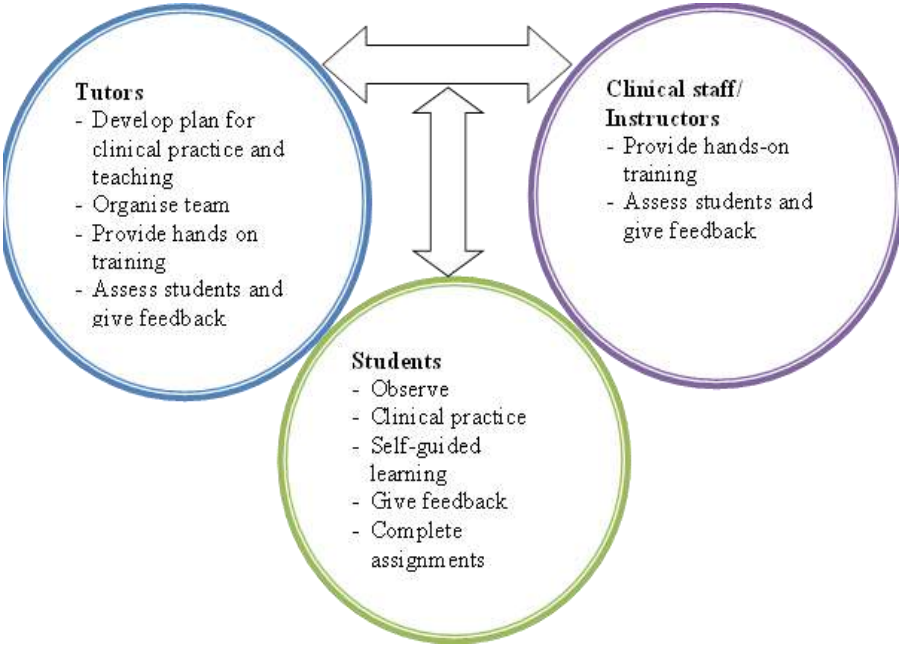
Section II: The Practical Teaching Team and Their Roles

Implementation of practical training requires the collaborative efforts of tutors, practical instructors and students. Each of these groups has different roles in the teaching and learning process. The relationship between members of the practical teaching team and students is important. Tutors, practical instructors and students must communicate clearly with each other during the learning process.

Students will gain the most from their experiences when feedback is given constructively in the spirit of promoting learning. Students are not expected to know how to do everything perfectly at once, but rather, they are in the process of learning to improve upon their current skills and learn new ones.

The practical instructor or tutor will work with each student or a group of students during the process of practical learning and teaching. The tutor and practical instructor will be responsible to monitor, evaluate, and give constructive feedback on students' learning. The students will have the opportunity to seek guidance from and provide feedback to the tutors and practical instructors.

Figure 1: Roles and Responsibilities of Tutors, Practical instructors and Students



Roles and Responsibilities of a Tutor in Practical Teaching

The main role of a tutor is to plan and coordinate the placement of students and teach students in the practical settings. He/she will have the following roles in guiding students:

- Ensure that students have completed prerequisite classroom sessions prior to starting the relevant practicum

- Develop a curriculum cum rotation plan (CCRP)
- Decide on the times during which students should go to the practicum
- Identify practicum sites
- Identify practical instructors for specific skills
- Plan for practical teaching which indicates who, what, when and how to guide students in the practical area
- Set practical objectives for each placement
    - These objectives can be set at the beginning of the practical placement and reviewed regularly
- Communicate CCRP to students and provide Practicum Guide and Practical Procedure Books to each student
- Meet with relevant practical instructors and non-Medical Laboratory staff to orient them on:
    - The practical objectives, competencies and skills which students are expected to achieve while in the practical setting
    - The specific assignments and student assessment tools e.g. checklists for each placement
    - Grading system as based on the curriculum
- Discuss with hospital administration to agree on how the groups should be divided
    - Students should go in small groups to the Laboratory department and other areas as necessary
- Create a schedule for the practicum and share this with students, practical instructors and administration

    - Should be based on discussions, group sizes, timing, and availability of relevant staff
- Visit the students in the laboratory for practical teaching and guidance
- Document all activities done by the students and monitor progress
- Plan for practical evaluation after making sure that the students have acquired the necessary skills
- Give feedback correctly, fairly and constructively
    - Giving constructive feedback means pointing out the things that the student does correctly as well as things for the student to improve on
- Organise training resources to be used in the practicum
- Liaise with practical instructors on a daily basis to ensure that students are acquiring competencies when rotating in the different departments
- Liaise with practical instructors to continuously assess student abilities.
- Introduce students to practical instructors and other non- medical laboratory staff

Roles and Responsibilities of the Practical Instructors

At every practical placement site, practical instructors should be identified to directly guide students achieve competencies in specific areas. The following are their roles and responsibilities:

- Receive and orient students to the Laboratory area

- Introduce students to other staffs
- Assign students to specific tasks
- Work with the students to set daily practical learning objectives and plan
- Teach and guide students to learn the intended skills
- Demonstrate and provide regular guidance to students
- Give constructive feedback to students and complete student checklist based on participation in activities in different areas:
    - Giving constructive feedback means pointing out the things that the student does correctly as well as things for the student to improve on
- Act as a good role model for professional conduct
- Meet with students and tutors to discuss student progress and practical challenges
- Document student achievements in their Practical Procedure Books and assessment tools, e.g. checklists
- Participate in student practical monitoring and evaluation
- Write reports on students' performances and progress; and submit them to the institution

Roles and Responsibilities of Non-teaching Medical Laboratory Staff (other staff in health facilities)

Non-teaching Medical Laboratory staff in the different areas should facilitate student learning by assisting students to achieve their objectives. The non- teaching Medical Laboratory staff will be expected to:

- Facilitate integration of the students into practical sites
- Provide students with relevant tools and materials
- Show students the best ways of behaving in practical sites

Roles and Responsibilities of the Student in practical Setting

Students are expected to show diligence in practical areas and behave in a way that is consistent with ethical practice. Students will have the following roles:

- Learn the hospital laboratory setting leadership, policies, routine and procedures
- Learn practical skills according to Practical learning objectives
- Present performed practical summaries, challenges encountered and other assignments to practical instructors and tutors as relevant
- Perform other duties as assigned by practical instructors at the relevant site
- Complete assignments and submit them to the relevant practical instructor or tutor as appropriate

- Maintain laboratory records correctly
- Support fellow students in the practical areas for effective learning
- Share practical learning experiences in classroom and laboratory in case presentations
- Receive feedback from tutors and practical instructors on progress and discuss/ask questions
- Provide feedback to tutors and practical instructors on practical teaching and learning process

NOTE: Other specific roles will depend on the specific area in which the student will be placed.

Patient/Client as a Resource

Patient/Client is a very important resource and plays a key role in the practical learning of students. He/she is a constant resource for students as source of laboratory specimens. However, the patient/client has rights which tutor, laboratory staff/ practical instructor and student have to observe as they interact with the patient/client. These rights include:

- Being treated with compassion, love and respect.
- Getting correct information about his/her test requested and procedures.
- Complaining and appealing in accordance with established procedures.
- The right to privacy and confidentiality.
- Refusing services if they do not meet the required needs and standards.

- Accessing health services, facilities and information according to their needs.
- The right for informed consent, self-expression and choice of care.
- Knowing health facility rules and regulations that apply to his/her conduct as a patient.

Section III: Practical Competencies According to NTA Level 5

Introduction

The NTA level 5 graduates (Health Laboratory Technologists) are expected to apply professional ethics and code of conduct to perform general phlebotomy duties and routine clinical laboratory investigations; prepare reagents, collect specimens, order supplies, perform External Quality Assessment (EQA) and manage non-conformances and maintain laboratory records in health service facilities.

Table 1: Summary of practical Competencies According to NTA Level 5

<table>
<tr><td>Principal Outcomes</td><td colspan="3">By the end of NTA level 5 students will be able to:
Apply knowledge and skills of Logistics to manage Laboratory store
Apply principles of preventive maintenance and calibration to operate laboratory equipment and instruments
Apply principles of pathology to diagnose diseases and conditions
Apply principles of entrepreneur to establish and manage health services
Apply principles of Quality Assurance and non -conformances management to improve laboratory services
Apply knowledge and skills of information system in health settings operations</td></tr>
<tr><td rowspan="3">NTA Level 5</td><td colspan="2">Semester Subject Areas</td><td rowspan="2">Training Sites</td></tr>
<tr><td>Tasks for Semester 1</td><td>Tasks for Semester 2</td></tr>
<tr><td>Evaluate quotation for equipment and supplies
Develop specifications of equipment/inst</td><td>Diagnose diseases using haematological techniques
Perform</td><td>Health centre laboratories
Hospital</td></tr>
</table>

	ruments and supplies • Manage laboratory store • Perform Planned Preventive Maintenance for laboratory instrument and equipment • Perform calibration of laboratory instruments and equipment • Develop PPM and calibration logs for laboratory instruments and equipment • Prepare business plan • Manage laboratory operations • Develop and utilize tools for laboratory	• Blood transfusion investigations • Investigate diseases using microbiological techniques • Diagnose diseases using clinical chemistry skills • Diagnose diseases using parasitological techniques • Perform specimen fixation using cytological and histologic	laboratories • Autonomous Laboratories (level C, B or A)

	quality assurance • Manage health records • Manage data in health facilities	al techniques • Perform specimen transportation using cytological and histological knowledge	

Aim

The overall aim of the NTA Level 5 practicum is to enable trainees to acquire the necessary skills in Maintenance and Calibration of Laboratory Instruments and Equipment, Hematological, Parasitological, Microbiological, Clinical Chemistry and Histological &Cytological.

These skills will enable students upon graduation to be able to provide quality health services to patient level. The following broad aims have been proposed for trainees to:

- Be able to procure laboratory equipment and supplies according to pre-set specifications
- Be able to maintain and calibrate laboratory instrument and equipment
- Be able to prepare a business plan
- Be able to maintain laboratory quality assurance
- Be competent in managing health records
- Be competent in performing different laboratory diagnostic techniques

Practical Learning Outcomes

By the end of NTA level 5 practicum students are expected to be able to:

- Apply knowledge and skills of Logistics system to manage Laboratory equipment and supplies
- Apply principles of preventive maintenance and calibration to operate laboratory equipment and instruments

- Apply principles of entrepreneurship to establish and manage health services
- Apply principles of Quality Assurance and non - conformances management to improve laboratory services
- Apply principles of pathology to diagnose diseases and conditions
- Apply knowledge and skills of information system in health settings operations

Practical Competencies/Skills

- Evaluate received quotation from supplier
- Develop specifications for laboratory equipment/instruments and supplies
- Calculate minimum stock/re-order level
- Calculate Maximum stock level
- Perform stock taking
- Conduct physical inventory count
- Prepare and use store ledger
- Prepare and use bin cards
- Conduct Quantification of health commodities
- Perform routine maintenance of hematology analyzer, chemistry analyzer, autoclave, hot air oven, water bath, hot plate, incubator, microscope, weighing scale, automated and non-automated pipettes, timer and thermometer
- Perform calibration of micropipettes, pH meter, colorimeter, analytic balance, chemistry analyzer, flow cytometer and Automated Hematology analyzer
- Develop maintenance logs
- Develop calibration logs
- Conduct business environmental analysis using (SWOT/SWOC and PESTEL analysis)
- Prepare business plan
- Prepare sales and purchases registers
- Prepare double entry book keeping

- Develop tools for monitoring quality assurance processes in laboratory operations
- Perform Internal Quality Control and External Quality Control/ Proficiency Testing
- Document quality assurance performances to monitor laboratory processes
- Keep quality assurance records for verification performances and assessments
- Develop action plan on areas of improvement
- Develop SOP for different laboratory operations, non-conformances form, non-conformances log, corrective and preventive action forms
- Document non-conformances in non-conformances form and log/register book
- Archive non-conformances form and log for traceability
- Prepare non-conformances management report and corrective action report
- Perform root cause analysis to determine failure in quality assurance performances
- Fill corrective and preventive forms for failures in quality assurance performances
- Communicate the findings of the problem to other staff or relevant authority for continual improvement
- Record client information in the register book

- Record temperature in the charts according to guidelines
- Fill appropriate information in the log books according to guidelines
- Store record in secured and easily retrievable place
- Maintain procedures of eHMIS for recording laboratory information
- Use the eHMIS for recording laboratory information
- Communicate laboratory information to relevant authority using eHMIS
- Use password to limit accessibility of stored laboratory information
- Store laboratory information in different electronic software
- Demonstrate data presentation for different laboratory activities
- Communicate laboratory data through various methods
- Perform Sickle cell screening test by 2% sodium metabisulphite method
- Perform CD4, CD8 count by using flow cytometer in hematology
- Perform full blood picture using Hematology analyzer
- Perform total white blood cell count using Turk's solution

- Prepare thin blood film for identification of white blood cells
- Stain thin blood film using Leishman/Wright stain
- Identify quality of staining
- Perform Hb estimation ($CuSO_4$, Hemoglobinometry, Photometry)
- Perform ABO cell grouping (tile and tube)
- Perform ABO serum blood grouping (tile and tube)
- Perform Rhesus blood grouping Perform compatibility test by tube method (at room temperature)
- Perform compatibility test by tube method (at 37^oC incubation)
- Prepare skin snip for ZN cold technique
- Collect skin scraping, hair and nails for detection of fungal element
- Perform hot ZN staining technique
- Perform cold ZN staining technique
- Perform Auramine staining technique
- Perform 10% KOH technique for detection of fungal elements
- Perform hanging drop technique for detection of Vibrio cholerae
- Perform Gram Stain technique for differentiation of micro-organisms
- Perform wet preparation technique for detection of bacteria, yeast and pus cells in specimens

- Perform simple staining techniques (Methylene blue stain)
- Perform negative staining technique (India Ink, Nigrosine)
- Perform Cryptococcal antibody test in serum with the latex method
- Perform Helicobacter pylori antibody/antigen tests
- Perform Pandy's Test to determine protein in CSF
- Perform Coomassie Brilliant Blue method to determine protein in CSF
- Perform Biurrette Method to determine total protein in ascetic fluid, pleural fluid and serum
- Perform Bromol Cresol Green for serum/plasma albumin
- Perform Protein Testing in urine by using 20% Sulphosalcylic Acid
- Perform Fouchest Test to determine bilirubin in urine
- Perform Glucose Oxidase/Hexokinase Test to determine glucose in serum/plasma, pleura and ascitic fluid
- Prepare Thick Blood Smear for investigation of blood parasites according to SOP
- Perform Giemsa Staining Technique for identification of parasite (counting method of Plasmodium spp; quantitatively MPS/WBC and MPS/micro litre)

- Perform Buffy Coat Techniques for identification of motile blood parasites
- Perform Wet Preparation Technique for investigation of intestinal parasite
- Perform Formal Ether Concentration technique for investigation of intestinal parasite
- Perform Urine Wet Preparation Technique for investigation of urinary parasites
- Perform Urine Wet Preparation Technique for cell counting (e.g., RBCs, WBCs, Epithelial cells etc.)
- Fix histological tissue specimen using 10% formalin, 95% alcohol and 50:50 ether-ethanol
- Fix cytological smear using vapor, liquids and air drying
- Transport cytological and histological specimen according to guidelines

Practical Opportunities

During NTA level 5 students will be oriented to specific practical areas and will:

i. Carry out the skills acquired during NTA levels 4
ii. Students will be trained for a professional world (Practical skills). Where they will practise thinking and acting like professional Medical laboratory Technologist by experiencing the equipment, protocols and working environment of a real medical laboratory which fits their needs.

iii. Will gain Intellectual skills through producing data from practical acquire, processes, analyse and interpret. Achieving this requires application, analysis and evaluation, higher order thinking skills which add value to their profession.

iv. Will gain Personal / transferable skills due to Working together with medical laboratory staffs and enhance their effective communication and organization.

Prerequisites

Before starting the practicum, students should have completed NTA level 4 and had started theoretical preparation in this level. Students can go to practical areas at the same time as they are receiving didactic training. These exposures are related to the particular area covered in class.

Section IV: Semester I Practicum Modules

Students will rotate in Laboratory settings for acquisition of skills during the training of the following five (5) modules.

Table 2: Semester I Practicum Modules

Module Code and Title	Scheme of Study (Hours per week)	
	Practical	Practicum Activity
MLT05101Laboratory Logistic Management	1	• Develop specifications of equipment/instruments and supplies during procurement • Determine required quantity of commodities in health facility
MLT05102 Maintenance and Calibration of Laboratory	2	• Performing maintenance, preventive maintenance and calibration of

Instruments and Equipment		laboratory instruments and equipment
MLT05103 Principles of Entrepreneurship	2	• Develop business plan
MLT05104 Laboratory Quality Assurance	2	• Monitor laboratory operations • Prepare quality assessment reports in laboratory operations
MLT05105 Health Records Management	1	• Perform data management in health facilities
TOTAL	**8**	

Practicum Module: MLT 05101 Laboratory Logistic Management

Total Practical Time: 20 hours in 20 weeks of a semester

Aim: The aim of Laboratory practice in Laboratory Logistic Management is for students to acquire skills and professional attitudes necessary to Manage laboratory equipment and supplies.

Practical Learning Outcomes

By the end of practicum, students are expected to be able:

- Apply knowledge and skills of logistics system to manage laboratory equipment and supplies

Competencies/Skills

- Develop quotation form for equipment and supplies
- Evaluating Received Quotation from Supplier
- Develop specifications for laboratory equipment/ instruments and supplies.
- Calculate minimum stock/re-order level
- Calculate Maximum stock level
- Perform stock taking to determine months of stock.
- Conduct physical inventory count
- Prepare and use store ledger
- Prepare and use bin cards
- Conduct Quantification of health commodities using consumption data and budget

Practicum Resources

- Practical procedure book
- Checklists
- Laboratory rotation plan
- Practical assignment sheets
- All necessary working tools/supplies

Prerequisite modules

None

Practical Placement

During the practical placement for Laboratory Logistic management in hospital/laboratory Procurement office, students will be trained on management of laboratory equipment and supplies. Where they will have an opportunity to observe and practice desired competencies relating on procedures for managing laboratory equipment.

Activity 1: **Developing quotation form for equipment and supplies**

During practical session in the hospital/laboratory procurement office, you will be divided in small manageable groups and be assigned the following:

- Develop quotation form for equipment and supplies

Assignment

Develop and submit quotation form for equipment and supplies to practical instructor for feedback

Activity 2: **Evaluating Received Quotation from Supplier**

During practical session in the hospital/laboratory procurement office, you will be divided in small manageable groups and be assigned to evaluate Received Quotation from Supplier

Assignment

Evaluate received quotation from supplier individually under the supervision of practical instructor

Activity 3: Developing specifications for laboratory equipment/ instruments and supplies

During practical session in the hospital/laboratory procurement office, you will be divided in small manageable groups and be assigned to develop specifications for laboratory equipment/ instruments and supplies.

Assignment
Develop specifications for laboratory equipment/ instruments and supplies in groups and submit to practical instructor for feedback

Activity 4: Calculating minimum stock/re-order level and maximum stock level
During practical session in the hospital/laboratory procurement office, you will be divided in small manageable groups and be assigned the following:

- Calculate minimum stock/re-order level
- Calculate maximum stock level

Assignment 1
Calculate minimum stock/re-order level in groups and submit findings to practical instructor for feedback

Assignment 2
Calculate maximum stock level in groups and submit findings to practical instructor for feedback

Activity 5: Performing stock taking to determine months of stock
During practical session in the hospital/laboratory procurement office, you will be divided in small manageable groups and be assigned to perform stock taking to determine months of stock

Assignment

Perform stock taking to determine months of stock in groups and present in plenary

Activity 6: Conducting physical inventory count

During practical session in the hospital/laboratory procurement office, you will be divided in small manageable groups and be assigned to conduct physical inventory count

Assignment

Conduct physical inventory count in groups and present in plenary

Activity 7: Preparing and using Store Ledger

During practical session in the hospital/laboratory procurement office, you will be divided in small manageable groups and be assigned the following:

- Prepare store ledger
- Use store ledger

Assignment

Prepare and fill store ledger in groups and submit them to practical instructor for feedback

Activity 8: Preparing and using bin cards

During practical session in the hospital/laboratory procurement office, you will be divided in small manageable groups and be assigned the following:

- Prepare bin cards
- Use bin cards

Assignment
Prepare and fill bin cards in groups and submit them to practical instructor for feedback

Activity 9: Conducting Quantification of health commodities using consumption data and budget
During practical session in the hospital/laboratory procurement office, you will be divided in small manageable groups and be assigned to conduct quantification of health commodities using consumption data and budget

Assignment
Conduct quantification of health commodities using consumption data and budget in small groups and present in plenary

End of Practicum Assignment

At the end of the practical session you will be required to write a report on skills you practiced. The report shall be shared in plenary presentation. The report shall cover all activities practiced in Laboratory Logistics Management

Checklist 1: Quotation form for equipment and supplies

Skills	
Standard	**Criteria**
1.1 Developing quotation form for equipment and supplies	1.1.1 Indicate space to write address of institution
	1.1.2 Indicate a column to list supplies/ equipment needed
	1.1.3 Indicate column to list estimated price of bidder
	1.1.4 Indicate space for suppliers' signature and Official stamp
1.2 Evaluation of received quotations from supplier	1.2.1 Check if all information is properly filled
	1.2.2 Check if price per each item is indicated
	1.2.3 Check if the document is signed and stamped by bidder
1.3 Developing specifications for Laboratory equipment/instrument and supplies	1.3.1 Indicate details of required specifications of items in quotation
	1.3.2 Indicate unit measurement for all listed items

Checklist 2: Calculation of stock level

Skills	
Standard	**Criteria**
2.1 Calculating minimum stock/reorder level	2.1.1 Identify average consumption of items
	2.1.2 Identify lead time
	2.1.3 Identify nature of materials needed
	2.1.4 Indicate maximum quantity of materials required
	2.1.5 Calculate reordering level
2.2 Calculating maximum stock level	2.2.1 Calculate maximum stock level

Checklist 3: Performance of Stock taking

Skills	
Standard	**Criteria**
3.1 Performing stock taking to determine months of stock	3.1.1 Prepare schedule for stock taking
	3.1.2 Develop stock taking tools

Skills	
Standard	**Criteria**
	3.1.3 Conduct physical counts
	3.1.4 Prepare stock taking report
	3.1.5 Update store records

Checklist 4: Develop store ledger and bin card

Skills	
Standard	**Criteria**
4.1 Preparation and use of store ledger	4.1.1 Indicate correct format of the ledger
	4.1.2 Document received items properly
	4.1.3 Document issued items properly
	4.1.4 Document balance items properly
4.2 Preparation and use of bin cards	4.2.1 Indicate correct format of bin card
	4.2.2 Document received items properly
	4.2.3 Document issued items properly

Skills	
Standard	**Criteria**
	4.2.4 Document balance items properly

Practicum Module: MLT 05102 Maintenance and Calibration of Laboratory Instruments and Equipment

Total Practical Time: 50 hours in 20 weeks of a semester

Aim: The aim of Laboratory practice in Maintenance and Calibration of Laboratory Instruments and Equipment is for students to acquire skills and professional attitudes necessary to Manage and operate laboratory equipment and instruments.

Practical Learning Outcomes

By the end of practicum, students are expected to be able:

- Apply principles of preventive maintenance and calibration to operate laboratory equipment and instruments

Competencies/Skills

- Perform routine maintenance of hematology analyzer, chemistry analyzer, autoclave, hot air oven, water bath, hot plate, incubator, microscope, weighing scale, automated and non-automated pipettes, timer and thermometer
- Perform calibration of micropipettes, pH meter, colorimeter, analytic balance, chemistry analyzer, flow cytometer and Automated Hematology analyzer
- Develop maintenance logs
- Develop calibration logs

Practicum Resources

- Practical procedure book
- Checklists
- Laboratory rotation plan
- Practical assignment sheets
- User manual
- Standard operating procedures
- All necessary working tools/supplies

Prerequisite modules

None

Practical Placement

During the practical placement in hospital laboratories, students will get opportunities to develop maintenance and calibration logs and practise maintenance and calibration various instruments and equipment.

Activity 1: Performing routine Maintenance of Haematology Analyzer

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance of haematology analyser and fill the equipment maintenance log

Assignment:

Perform daily maintenance of haematology analyser and fill the maintenance log in groups under supervision of practical instructor

Activity 2: Perform routine maintenance of chemistry analyzer

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform daily maintenance of Chemistry analyser and fill the equipment maintenance Log

Assignment

Perform daily maintenance of chemistry analyser and fill the maintenance log individually under supervision of practical instructor

Activity 3: Performing routine maintenance of Autoclave

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance of autoclave and fill the equipment maintenance log

Assignment

Perform daily maintenance of autoclave and fill the maintenance log individually under supervision of practical instructor

Activity 4: Performing routine maintenance of hot air oven

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance of hot air oven and fill the equipment maintenance log

Assignment

Perform daily maintenance of hot air oven and fill the maintenance log individually under supervision of practical instructor

Activity 5: Performing routine maintenance of water bath

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance water bath and fill the equipment maintenance log

Assignment

Perform daily maintenance of water bath and fill the maintenance log individually under supervision of practical instructor

Activity 6: Performing routine maintenance of hot plate

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance hot plate and fill the equipment maintenance log

Assignment
Perform daily maintenance of hot plate and fill the maintenance log individually under supervision of practical instructor

Activity 7: Performing routine maintenance of incubator
During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance incubator and fill the equipment maintenance log

Assignment
Perform daily maintenance of incubator and fill the maintenance log under individually supervision of practical instructor

Activity 8: Performing routine maintenance of Microscope
During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance Microscope and fill the equipment maintenance log

Assignment
Perform daily maintenance of microscope and fill the maintenance log individually under supervision of practical instructor

Activity 9: Performing routine maintenance of weighing scale

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance weighing scale and fill the equipment maintenance log

Assignment

Perform daily maintenance of weighing scale and fill the maintenance log individually under supervision of practical instructor

Activity 10: Performing routine maintenance of automated and non-automated pipette

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance automated and non-automated pipette and fill the equipment maintenance log

Assignment

Perform daily maintenance of automated and non-automated pipettes and fill the maintenance log individually under supervision of practical instructor

Activity 11: Performing routine maintenance of timer

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance of timer and fill the equipment maintenance log

Assignment

Perform daily maintenance of timer and fill the maintenance log individually under supervision of practical instructor

Activity 12: Performing routine maintenance of Thermometer

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine maintenance of thermometer and fill the equipment maintenance log

Assignment

Perform daily maintenance of thermometer and fill the maintenance log individually under supervision of practical instructor

Activity 13: Performing calibration of micropipette

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform routine calibration of micropipette and fill the equipment calibration log

Assignment

Calibrate micropipette and fill calibration log individually under supervision of practical instructor

Activity 14: Performing calibration of pH meter

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to perform calibration of pH meter and fill the equipment calibration Log

Assignment

Calibrate pH meter according to SOP and fill calibration log individually under supervision of practical instructor

Activity 15: Performing calibration of colorimeter

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to calibrate Colorimeter and fill the equipment calibration Log

Assignment

Calibrate colorimeter according to SOP and fill calibration log individually under supervision of practical instructor

Activity 16: Performing routine maintenance of Analytic balance

During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to calibrate analytical balance and fill the equipment calibration log

Assignment

Calibrate analytic balance according to SOP and fill calibration log individually under supervision of practical instructor

Activity 17: Performing calibration of Chemistry Analyzer
During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to calibrate Chemistry analyser and fill the equipment calibration log

Assignment
Calibrate chemistry analyzer according to SOP and fill calibration log individually under supervision of practical instructor

Activity 18: Performing calibration of Haematology Analyzer
During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to calibrate haematology analyser and fill the equipment calibration log

Assignment
Calibrate haematology analyzer according to SOP and fill calibration log individually under supervision of practical instructor

Activity 19: Performing calibration of Flow Cytometer
During practical session in the hospital laboratory, you will be divided in small manageable groups and be assigned to calibrate Flow Cytometer and fill the equipment calibration log

Assignment
Calibrate flow cytometer according to SOP and fill calibration log individually under supervision of practical instructor

End of Practicum Assignment

At the end of the Maintenance and Calibration of Laboratory Instruments and Equipment practical sessions/placement, you will be required to write a report on skills he/she practised. The report shall be submitted to the tutor for plenary presentation and feedback. The report should cover:

Routine maintenance of any laboratory equipment trained **or**

Calibration of any laboratory equipment trained

Monitoring and Evaluation

Practical instructors and tutors will make daily observations of students, provide support and document progress according to practicum competencies, and using checklists provided. The Practical instructors and tutors will give timely feedback for student's improvement. The report shall be assessed then immediate feedback shall be given to the student.

Checklist 5: Routine maintenance of Laboratory instruments and equipment

Skills	
Standard	**Criteria**
5.1 Performing routine maintenance of haematology analyzer	5.1.1 Prime the instrument
	5.1.2 Clean the equipment using a soft, clean cloth
	5.1.3 Clean the probe using concentrated cleaner
	5.1.4 Close down the instrument at the end of each day, following the manufacturer's instructions
	5.1.5 Cover the instrument after use
	5.1.6 Disconnect the power source by switching off at the wall socket and remove the plug, or disconnect the battery terminals
	5.2.1 Prime the instrument

Skills	
Standard	**Criteria**
5.2 Performing routine maintenance of chemistry analyzer	5.2.2 Clean the equipment using a soft, clean cloth
	5.2.3 Clean the probe using concentrated cleaner
	5.2.4 Close down the instrument at the end of each day, follow the manufacturer's instructions
	5.2.5 Cover the instrument after use
	5.2.6 Disconnect the power source by switching off at the wall socket and remove the plug, or disconnect the battery terminals
5.3 Performing routine maintenance of autoclave according to SOP	5.3.1 Clean the inside and outside of the autoclave with a cloth dampened in distilled water
	5.3.2 Clean the pressure and safety valves using a

Skills	
Standard	**Criteria**
	swab moistened with distilled water
	5.3.3 Lubricate the autoclave clamps using high melting point grease
5.4 Performing routine maintenance of hot air oven	5.4.1 Clean the hot air oven using a damp cloth soaked in soapy water
	5.4.2 Lubricate the mechanical parts of the door lock using heat-resistant oil or silicone grease.
	5.4.3 Disconnect the hot air oven after use
5.5 Performing routine maintenance of water bath	5.5.1 Clean inside and outside of water bath using distilled water
	5.5.2 Change water
	5.5.3 Use a voltage stabilizer
5.6 Performing routine maintenance of hot plate	5.6.1 Clean all spills immediately and thoroughly

Skills	
Standard	**Criteria**
5.7 Performing routine maintenance of incubator	5.7.1 Clean the incubator regularly
	5.7.2 Use a non-corrosive disinfectant
	5.7.3 Lubricate the mechanical parts of the door
5.8 Performing routine maintenance of microscope	5.8.1 Clean the lenses with lens tissue
	5.8.2 Check the optics and lenses for damage
	5.8.3 Use a mild soap solution to remove heavy contamination from the instrument surface.
	5.8.4 Disconnect the power source by switching off at the wall socket and remove the plug, or disconnect the battery terminals

Skills	
Standard	**Criteria**
	5.8.5 Cover the microscope after use
5.9 Performing routine maintenance of weighing scale	5.9.1 Clean the weighing scale with a damp cloth
	5.9.2 Cover weighing scale when not in use
5.10 Performing routine maintenance of automated and non-automated pipettes	5.10.1 Decontaminate the outside of the pipette
	5.10.2 Inspect the general appearance of the pipette
	5.10.3 Clean the pipette.
	5.10.4 Check functionality
5.11 Performing routine maintenance of timer	5.11.1 Clean the timer by wiping it with a dry cloth.
	5.11.2 Remove the battery when the timer is not in use
	5.11.3 Store in a dry, dust-free environment
	5.12.1 Store thermometer in the case

Skills	
Standard	**Criteria**
5.12 Performing routine maintenance of thermometer	5.12.2 Keep thermometer in a dry place

Checklist 6: Calibration of Laboratory instruments and equipment

Skills	
Standard	**Criteria**
6.1 Performing calibration of micropipette	6.1.1 Use distilled water during calibration
	6.1.2 Place a weigh boat on a balance that can accurately weigh in the microgram range and set it to zero after closing the balance door
	6.1.3 Pre-rinse the tip by aspirating and dispensing the set volume three times and push fully to remove any remaining liquid
	6.1.4 Aspirate the calibration volume without bubble formation
	6.1.5 Determine the mean value from ten trials
	6.1.6 Adjust the pipettes to the calibration environment for more than an hour before starting the calibration

Skills	
Standard	**Criteria**
6.2 Performing calibration of pH Meter	6.2.1 Select the pH Mode and set the temperature control knob to 25°C.
6.3	6.2.2 Rinse the electrode with deionized water and blot dry using a piece of tissue
	6.2.3 Place the electrode in the solution of pH 7 buffer, allow the display to stabilize and, then, set the display to read 7 by adjusting cal 1.
	6.2.4 Remove the electrode from the buffer.
	6.2.5 Rinse the electrode with deionized water and blot dry using a piece of tissue
	6.2.6 Place the electrode in the solution of pH 2 buffer, allow the display to stabilize and, then, set the display to read 2 by adjusting cal 2.
	6.3.1 Allow the Colorimeter to warm up for 5 minutes.

Skills	
Standard	**Criteria**
6.3 Performing calibration of Colorimeter	6.3.2 Place a cuvette, about 3/4 full of distilled water, in the Colorimeter and close the lid
	6.3.3 Check the absorbance readings, which should be very nearly zero.
6.4 Performing calibration of analytic balance	6.4.1 Calibrate analytical balance according to manufacturer instructions
6.5 Performing calibration of chemistry analyzer	6.5.1 Calibrate chemistry analyzer according to manufacturer instructions
6.6 Performing calibration of flow cytometer	6.6.1 Calibrate flow cytometer according to manufacturer instructions
6.7 Performing calibration of automated haematology analyzer	6.7.1 Calibrate automated haematology analyzer according to manufacturer instructions

Checklist 7: Development of maintenance log

Skills	
Standard	**Criteria**
7.1 Developing maintenance log	7.1.1 Indicate name of the equipment
	7.1.2 Indicate serial number of the equipment
	7.1.3 Indicate the manufacturer of equipment
	7.1.4 Indicate the manufacturer contact details
	7.1.5 Indicate date of maintenance
	7.1.6 Indicate maintenance description
	7.1.7 Indicate maintenance frequency
	7.1.8 Indicate the name of the person performed maintenance

Skills	
Standard	**Criteria**
	7.1.9 Indicate date of validation before put in service
	7.1.10 Indicate name of the person performed validation
	7.1.11 Indicate date of next maintenance
	7.1.12 Indicate remarks section

Checklist 8: Development of calibration log

Skills	
Standard	**Criteria**
8.1 Developing calibration log	8.1.1 Indicate name of the equipment
	8.1.2 Indicate serial number of the equipment
	8.1.3 Indicate the manufacturer of equipment
	8.1.4 Indicate date of calibration
	8.1.5 Indicate the name of the person performed calibration
	8.1.6 Indicate calibration cycle
	8.1.7 Indicate remarks section

Practicum Module: MLT05103 Principles of Entrepreneurship

Total Practical Time: 20 hours in 20 weeks of a Semester

Aim:

The aim of the practicum is to give students opportunities to archive entrepreneur skills to establish and manage health services.

Practical Learning Outcomes

By the end of practicum, students are expected to be able to:

- Apply entrepreneurial skills in developing a business plan for a selected business
- Apply skills of business record keeping techniques in health industry

Competencies/Skills

- Conduct business environmental analysis using (SWOT/SWOC and PESTEL analysis)
- Prepare business plan
- Prepare sales and purchases registers
- Prepare double entry book keeping

Practicum Resources

- Practical procedure book
- Checklists

- Practical assignment sheets
- All necessary working tools/supplies

Prerequisite modules
None

Practical Placement
During the practical placement, students will have an opportunity to practice prescribed competencies relating to Business Plan development

Activity1: Conducting business environmental analysis
During practical placement, you will be divided in small manageable groups and be assigned the following:

- Use SWOT/SWOC to conduct business environmental analysis
- Use PESTEL to conduct business environmental analysis

Assignment
Conduct business environmental analysis using SWOT/SWOC and PESTEL in groups and present in plenary

Activity 2: Preparing business plan
During practical placement, you will be assigned individually to prepare a Business Plan

Assignment

Prepare a Business Plan individually and submit to the tutor for grading. You will present the business plan in plenary for grading

Activity 3: Preparing sales and purchases registers

During practical placement, you will be divided in small manageable groups and be assigned to prepare sales and purchases registers

Assignment

Prepare sales and purchases registers in groups and submit to tutor for feedback

Activity 4: Preparing double entry book keeping

During practical placement, divide students in small manageable groups and assign them to prepare double entry book keeping

Assignment

Prepare double entry book keeping in groups and submit to tutor for feedback

End of Practicum Assignment

At the end of the practical placement, prepare a Business Plan individually and submit to the tutor for grading. You shall present the business plan in plenary for grading

Monitoring and Evaluation

Tutors will make daily observations of students, provide support and document progress according to practicum competencies, and using checklists provided. The tutors will give timely feedback for student's improvement. The document shall be assessed then immediate feedback shall be given to the student.

Checklist 9: Development of Business Plan

Skills	
Standard	**Criteria**
9.1 Developing Business Plan	9.1.1 Prepare a cover page
	9.1.2 Prepare a table of content
	9.1.3 Describe an executive summary
	9.1.4 Describe the company profile
	9.1.5 Explain the industry analysis
	9.1.6 Explain the market analysis
	9.1.7 Describe the marketing plan
	9.1.8 Describe the management team and personnel
	9.1.9 Describe the production and operations plan
	9.1.10 Explain the financial forecast

Skills	
Standard	**Criteria**
	9.1.11 Explain risk assessment

Practicum Module: MLT 05104 Laboratory Quality Assurance

Total Practical Time: 10 hours in 20 weeks of a semester

Aim: To give opportunity to students to understand Quality Assurance and non-conformances management to improve laboratory services.

Practical Learning Outcome

By the end of practicum, students are expected to be able to:

- Apply knowledge and skills of quality assurance to monitor laboratory operations
- Apply quality assurance guidelines to prepare quality assessment reports in laboratory operations
- Apply skills of managing non-conformance in laboratory operations
- Apply principles of corrective and preventive measures in laboratory quality assurance

Competencies/Skills

- Develop tools for monitoring quality assurance processes in laboratory operations
- Perform Internal Quality Control and External Quality Control/ Proficiency Testing
- Document quality assurance performances to monitor laboratory processes
- Keep quality assurance records for verification performances and assessments
- Develop action plan on areas of improvement
- Develop SOP for different laboratory operations, non-conformances form, non-conformances log, corrective and preventive action forms
- Document non-conformances in non-conformances form and log/register book
- Archive non-conformances form and log for traceability
- Prepare non-conformances management report and corrective action report
- Perform root cause analysis to determine failure in quality assurance performances
- Fill corrective and preventive forms for failures in quality assurance performances
- Communicate the findings of the problem to other staff or relevant authority for continual improvement

Practicum Resources

- Practical procedure book
- Checklists
- Laboratory rotation plan
- Practical assignment sheets

- All necessary working tools/supplies

Prerequisites
None

Practical placement
During the practical placement in the laboratory, students will have an opportunity to observe, practice and acquire prescribed competencies relating to Laboratory Quality Assurance

Activity 1: Developing tools for monitoring quality assurance processes
During practical session, you will be divided in small manageable groups and be assigned the following:

- Develop Control charts, Levey-Jennings chart, and Assessment checklists for monitoring quality assurance processes
- Develop SOP for different laboratory operations, non-conformances form, non-conformances log, corrective and preventive action forms

Assignment
Develop Control charts, Levey-Jennings chart, Standard operating procedures, non-conformances form, non-conformances log, corrective and preventive action forms in groups and submit them to practical instructors for feedback

Activity 2: Performing monitoring of laboratory operations

During practical session, you will be divided in small manageable groups and be assigned the following:

- Perform Internal Quality Control and fill quality control logs and Levey Jennings chart
- Perform and document External Quality Control/ Proficiency Testing

Assignment

Perform Internal Quality Control and External Quality Control individually under practical instructor supervision

Assignment 2

Fill QC logs, Levey Jennings charts and EQA/PT logs individually. Submit records to practical instructor for feedback

Activity 3: Documenting and archiving quality assurance performance records

During practical session, you will be assigned individually to do the following:

- Document non-conformances in non-conformances form and log/register book
- Fill corrective and preventive forms
- Archive non-conformances form and log
- Archive quality control logs
- Archive Levey-Jennings charts
- Archive EQA results forms

Assignment

Document non-conformances, fill corrective and preventive forms and archive quality assurance records individually under practical instructor supervision

Activity 4: Performing root cause analysis to determine failure in quality assurance performances

During practical session, you will be divided in small manageable groups and be assigned the following:

- Perform root cause analysis using fish bone/cause & effect, brain storming, Pareto chart and 5Why
- Write corrective action report addressing the causes and measures of quality assurance failure
- Communicate the findings of the problem to other staff or relevant authority for continual improvement

Assignment

Prepare corrective and preventive action report in group and present in plenary

End of Practicum Assignment

At the end of the Laboratory Quality Assurance practical placement, you will be required to write a report on skills you practised. The report shall be submitted to the tutor for plenary presentation and feedback

Monitoring and Evaluation

Practical instructors and tutors will make daily observations of students, provide support and document progress according to practicum competencies, and using checklists provided. The Practical instructors and tutors will give timely feedback for student's improvement. The report shall be assessed then immediate feedback shall be given to the student

Checklist 10: Development of Levey-Jennings chart

Skills	
Standard	**Criteria**
10.1Developing Levey-Jennings chart	10.1.1 Indicate facility name
	10.1.2 Indicate document name/title
	10.1.3 Indicate document number
	10.1.4 Indicate document version number
	10.1.5 Indicate effective date
	10.1.6 Indicate vertical and horizontal scales
	10.1.7 Indicate month and year
	10.1.8 Indicate mean value
	10.1.9 Indicate standard deviation levels
	10.1.10 Indicate section for technician's initials

Skills	
Standard	**Criteria**
	10.1.11 Indicate section for supervisor's comments
	10.1.12 Indicate section for supervisor's initials

Checklist 11: Development of temperature charts

Skills	
Standard	**Criteria**
11.1 Developing temperature charts	11.1.1 Indicate facility name
	11.1.2 Indicate document name
	11.1.3 Indicate document number
	11.1.4 Indicate document version number
	11.1.5 Indicate effective date
	11.1.6 Indicate equipment/room
	11.1.7 Indicate month and year
	11.1.8 Indicate temperature range

Skills	
Standard	**Criteria**
	11.1.9 Indicate section for technician's initials
	11.1.10 Indicate section for supervisor's comments
	11.1.11 Indicate section for supervisor's signature section

Checklist 12: Conduction of External Quality Control/ Proficiency Testing

Skills	
Standard	**Criteria**
12.1 Conduction of External Quality Control/ Proficiency Testing	12.1 Receive EQA sample
	12.2 Document the EQA sample
	12.3 Perform requested EQA test procedure
	12.4 Record EQA results
	12.5 Send EQA results

Checklist 13: Development of SOP for different laboratory operations

Skills	
Standard	**Criteria**
13.1 Developing SOP for different laboratory operations	13.1.1 Indicate facility name
	13.1.2 Indicate document name

Skills	
Standard	**Criteria**
	13.1.3 Indicate document number
	13.1.4 Indicate document version number
	13.1.5 Indicate effective date
	13.1.6 Indicate control copy number
	13.1.7 Indicate authority of the document
	13.1.8 Indicate purpose of the procedure
	13.1.9 Indicate scope of the procedure
	13.1.10 Indicate principle of the procedure
	13.1.11 Indicate materials required
	13.1.12 Indicate standard precautions

Skills	
Standard	**Criteria**
	13.1.13 Indicate daily quality control procedure
	13.1.14 Indicate procedures
	13.1.15 Indicate results reporting
	13.1.16 Indicate supporting documents
	13.1.17 Indicate references
	13.1.18 Indicate amendments sheet
	13.1.19 Indicate declaration sheet

Checklist 14: Development of non-conformance form and log

Skills	
Standard	**Criteria**
14.1 Developing non-conformance form	14.1.1 Design the appropriate column and rows as per template
	14.1.2 Indicate the person involved in non-conformance
	14.1.3 Indicate the description of non-conformance
	14.1.4 Indicate the date, place, time and source of non-conformance
	14.1.5 Indicate name of the person who recorded the non-conformance
	14.1.6 Indicate the immediate and corrective actions taken in resolving non-conformance
	14.1.7 Indicate the medical significance of non- conformance
14.2 Developing non-conformance log	14.2.1 Design the appropriate column and rows as per template
	14.2.2 Indicate the non-conformance number
	14.2.3 Indicate name of the person assigned to record and close non-conformance

Skills	
Standard	**Criteria**
	14.2.4 Indicate the target completion date
	14.2.5 Indicate the category of non-conformance
	14.2.6 Indicate the status of completion of non-conformance

Checklist 15: Development of Corrective and Preventive action form

Skills	
Standard	**Criteria**
11.1 Developing corrective and preventive action form	15.1.1 Design the appropriate column and rows as per template
	15.1.2 Indicate the description of the issues triggering the need of corrective and preventive actions
	15.1.3 Indicate the scope toward the quality of product
	15.1.4 Indicate the route cause analysis/

		investigation/ risk assessment (using fish born or 5 WHY etc)
	15.1.5	Indicate the immediate corrective actions
	15.1.6	Indicate corrective and preventive actions (long term)
	15.1.7	Indicate verification of corrective and preventive actions
	15.1.8	Indicate the date and signature of the personnel involved

Checklist 16: Documenting and archiving quality assurance performance records

Skills	
Standard	**Criteria**
16.1 Documenting and archiving quality assurance performance records	16.1.1 Fill non-conformances in non-conformances form and log/register book
	16.1.2 Fill corrective and preventive forms
	16.1.3 Archive non-conformances form and log

	16.1.4 Archive Quality Control logs
	16.1.5 Archive Levey Jennings charts
	16.1.6 Archive EQA results forms

Practicum Module: MLT 05105 Health Records Management

Total Practical Time: 20 hours in 20 weeks of a semester

Aim: The aim of this practicum is to give opportunity to students to practice Health Laboratory Records Management.

Practical Learning Outcomes

By the end of practicum, students are expected to be able to:

- Apply skills of records management in health facilities
- Apply skills of electronic health management information system in health facilities
- Apply skills of information system for data management in health facilities
- Apply skills of data presentation in health facilities
- Apply skills of data communication system in health facilities

Competencies/skills

- Record client information in the register book
- Record temperature in the charts according to guidelines
- Fill appropriate information in the log books according to guidelines
- Store record in secured and easily retrievable place
- Maintain procedures of eHMIS for recording laboratory information
- Use the eHMIS for recording laboratory information
- Communicate laboratory information to relevant authority using eHMIS
- Use password to limit accessibility of stored laboratory information
- Store laboratory information in different electronic software
- Demonstrate data presentation for different laboratory activities
- Communicate laboratory data through various methods

Practicum resources

- Practical procedure book
- Temperature charts
- Log books
- Register books
- Checklists
- Laboratory rotation plan
- Practical assignment sheets
- All necessary working tools/supplies

Prerequisite modules
None

Practical placement
During the practical placement in the laboratory and hospital registry, students will have an opportunity to observe, practice and acquire prescribed competencies relating to Health Records Management

Activity 1: Managing Health Records
During practical session, you will be divided in small manageable groups and be assigned the following:

- Record client information in the Register book
- Record temperature readings in the charts according to guidelines
- Fill appropriate information in the Laboratory log books according to the guidelines
- Store record in secured and easily retrievable place

Assignment 1
Record client information in the Register book, chart temperature and fill laboratory log books individually under practical instructor supervision

Assignment 2
Store filled register book, temperature charts and laboratory log books in secured, easily retrievable place individually under practical instructor supervision

Activity 2: Managing eHMIS

During practical session, you will be divided in small manageable groups and be assigned the following:

- Maintain procedures of eHMIS for recording laboratory information
- Use the eHMIS for recording laboratory information
- Communicate laboratory information to relevant authority using eHMIS

Assignment

Record laboratory information using eHMIS in health facilities individually under practical instructor supervision

Activity 3: Data Management

During practical session, you will be divided in small manageable groups and be assigned the following:

- Demonstrate data presentation using Pie chart, Bar chart, Histogram, Table and line graph
- Communicate laboratory data through various methods
- Use password to limit accessibility of stored laboratory information
- Store laboratory information in different electronic software

Assignment 1

Analyse laboratory data using Pie chart, Bar chart, Histogram, Table and line graph individually and submit to tutor for feedback

Assignment 2

Demonstrate individually the procedures for storing laboratory information under practical instructor supervision

Activity 4: Performing data communication/dissemination

During practical session, you will be divided in small manageable groups and be assigned the following:

Communicate laboratory data through various methods

Assignment

Demonstrate individually the dissemination of data using electronic mail, social media and Postal Mail

End of Practicum Assignment

At the end of the Health Laboratory Records practical placement, you will be required to write a report on skills you practised. The report shall be submitted to the tutor for plenary presentation and feedback

Monitoring and Evaluation

Practical instructors and tutors will make daily observations of students, provide support and document progress according to practicum competencies, and using checklists provided. The Practical instructors and tutors will give timely feedback for student's improvement. The report shall be assessed then immediate feedback shall be given to the student

Checklist 17: Recording patient/client information in the register book

Skills	
Standard	**Criteria**
17.1 Recording patient/client information in the register book	17.1.1 Record patient/client information in their appropriate space
	17.1.2 Record laboratory test requested
	17.1.3 Record the sample collected
	17.1.4 Record date of laboratory test request
	17.1.5 Record name of the requesting clinician
	17.1.6 Write initials of the laboratory personnel involved

Checklist 18: Recording room temperature in the charts

Skills	
Standard	**Criteria**
18.1 Recording room temperature in the charts	18.1.1 Fill identification particulars in the temperature charts
	18.1.2 Plot the room temperature on the graph
	18.1.3 Write technician's initials involved

Checklist 19: Recording laboratory information using eHMIS

Skills	
Standard	**Criteria**
19.1 Recording laboratory information using Ehmis	19.1.1 Enter user name and password to access eHMIS
	19.1.2 Record particulars of received sample in eHMIS

Skills	
Standard	**Criteria**
	19.1.3 Record rejected sample, if any
	19.1.4 Accept sample in eHMIS
	19.1.5 Record results
	19.1.6 Verify results
	19.1.7 Submit the results

Section VI: Semester II Practicum Modules

Students will rotate in practical settings for acquisition of skills during the training of the following five (5) modules.

Table 3: Semester II Practicum Modules

Module Code and Title	Scheme of Study (Hours per week)	
	Practical	**Practicum Activity**
MLT05207 Haematology and Blood Transfusion	2	Perform haematological and blood transfusion investigations
MLT05208 Medical Microbiology and Immunology	2	Perform microbiological and immunological investigations
MLT05209 Clinical Chemistry	1½	Perform clinical chemistry investigations
MLT05210 Medical Parasitology	1½	Perform parasitological investigations
MLT05211 Cytology and Histology	1	Perform cytological and histological techniques
Total hours	**8**	

Practicum Module: MLT05207 Haematology and Blood Transfusion

Total Practical Time: 60 hours in 20 weeks of a semester

Aim: The goal of this practicum is for students to acquire appropriate competencies related to Hematology and blood transfusion in performing laboratory investigations

Practical Learning Outcome

By the end of practicum, students are expected to be able to:

- Apply skills of hematology in diagnosis of diseases
- Apply skills of Blood Transfusion in laboratory investigations

Competencies/Skills

- Perform Sickle cell screening test by 2% sodium metabisulphite method
- Perform CD4, CD8 count by using flow cytometer in hematology
- Perform full blood picture using Hematology analyzer
- Perform total white blood cell count using Turk's solution
- Prepare thin blood film for identification of white blood cells
- Stain thin blood film using Leishman/Wright stain
- Identify quality of staining
- Perform Hb estimation ($CuSO_4$, Hemoglobinometry, Photometry)
- Perform ABO cell grouping (tile and tube)
- Perform ABO serum blood grouping (tile and tube)

- Perform Rhesus blood grouping Perform compatibility test by tube method (at room temperature)
- Perform compatibility test by tube method (at 37^{o}C incubation)

Practicum resources

- Practical procedure book
- Checklists
- Laboratory rotation plan
- Practical assignment sheets
- All necessary working tools/supplies

Prerequisites

None

Practical placement

During the field attachment in the laboratory, students will have opportunity to observe, practice and acquire different skills.

Activity 1: Performing Sickle Cell Screening Test by 2% sodium Metabisulphite method

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Sickle Cell Screening Test by 2% sodium Metabisulphite method

Assignment

Perform Sickle Cell Screening Test by 2% sodium Metabisulphite method individually under practical instructor supervision

Activity 2: Performing CD4, CD8 count by using Flow Cytometer in Hematology

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform CD4, CD8 count by using Flow Cytometer

Assignment

Perform CD4, CD8 count by using Flow Cytometer individually under practical instructor supervision

Activity 3: Performing Full Blood Picture using Hematology Analyzer

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Full Blood Picture using hematology analyzer

Assignment

Perform Full Blood Picture using hematology analyzer individually under practical instructor supervision

Activity 4: Performing Total White Blood Cell Count using Turk's solution

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Total White Blood Cell Count using Turk's solution

Assignment

Perform Total White Blood Cell Count using Turk's solution individually under practical instructor supervision

Activity 5: Performing Thin Blood Film staining using Leishman/Wright stain

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform thin blood film staining using Leishman/Wright stain

Assignment

Perform thin blood film staining using Leishman/Wright stain individually under practical instructor supervision

Activity 6: Performing Hb Estimation ($Cuso_4$, Hemoglobinometry, Photometry)

During practical session in blood bank unit, you will be divided in small manageable groups and be assigned to perform Hb estimation (Cuso4, Haemoglobinometry, Photometry)

Assignment

Perform Hb estimation (Cuso4) individually under practical instructor supervision

Activity 7: Performing ABO Cell Grouping (tile and tube)
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform ABO Cell Grouping (tile and tube)

Assignment
Perform ABO Cell Grouping (tile and tube) individually under practical instructor supervision

Activity 8: Performing ABO Serum Blood Grouping (tile and tube)
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform ABO Serum Blood Grouping (tile and tube)

Assignment
Perform ABO Serum Blood Grouping (tile and tube) individually under practical instructor supervision

Activity 9: Performing Rhesus blood grouping

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Rhesus blood grouping

Assignment

Perform Rhesus blood grouping individually under practical instructor supervision

Activity 10: Performing Compatibility Test by tube method (at room temperature)

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform compatibility test by tube method (at room temperature)

Assignment

Perform compatibility Test by tube method (at room temperature) individually under practical instructor supervision

Activity 11: Performing Compatibility Test by tube method (at 37^0C)

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform compatibility test by tube method (at 37^0C)

Assignment

Perform compatibility Test by tube method (at 37^0C) individually under practical instructor supervision

End of Practicum Assignment At the end of the Haematology and blood transfusion practical placement, you will be required to write a report on skills you practised. The report shall be submitted to the tutor for plenary presentation and feedback.

Monitoring and Evaluation

Practical instructors and tutors will make daily observations of students, provide support and document progress according to practicum competencies, and using checklists provided. The Practical instructors and tutors will give timely feedback for student's improvement. The report shall be assessed then immediate feedback shall be given to the student

Checklist 20: Performance of Sickle cell screening

Skills	
Standard	**Criteria**
20.1.1 Performing Sickle cell screening test by 2% sodium metabisulphite method	20.1.1 Wear PPE
	20.1.2 Place a drop of blood on a glass slide
	20.1.3 Add sodium metabisulphite to the drop of blood and mix well
	20.1.4 Place a cover glass on top of the sample
	20.1.5 Seal the cover glass with molten paraffin wax or Vaseline
	20.1.6 Incubate the preparation
	20.1.7 Examine the preparation microscopically
	20.1.8 Report the findings

Checklist 21: CD4, CD8 counting by using flow cytometer

Skills	
Standard	**Criteria**
21.1 Perform CD4, CD8 count by using flow cytometer	21.1.1 Wear PPE
	21.1.2 Harvest cells
	21.1.3 Lyse red blood cells
	21.1.4 Block Fc-receptors
	21.1.5 Stain cell surface with antibody
	21.1.6 Incubate the preparation
	21.1.7 Perform flow cytometric analysis
	21.1.8 Report the findings

Checklist 22: Performance of full blood picture using Hematology analyzer

Skills	
Standard	**Criteria**
22.1 Performing full blood picture using Hematology analyzer	22.1.1 Wear PPE
	22.1.2 Enter patient details on the machine
	22.1.3 Mix well EDTA anticoagulated blood while checking for clots
	22.1.4 Run the blood sample in the machine

Checklist 23: Total white blood cell count using Turk's solution

Skills	
Standard	**Criteria**
23.1 Performing total white blood cell count using Turk's solution	23.1.1 Wear PPE
	23.1.2 Pipette Turk's diluting reagent into labelled test tubes
	23.1.3 Pipette whole blood into the diluting fluid in one test tube.
	23.1.4 Flush the pipette into the diluting fluid
	23.1.5 Mix each tube well by tapping the bottom of the tubes
	23.1.6 Fill the Neubauer chamber
	23.1.7 Place the counting chamber on the microscope stage
	23.1.8 Count the cells in the 4 large corner squares.
	23.1.9 Repeat the counting procedure for the other chamber and record the results

Skills	
Standard	**Criteria**
	23.1.10 Calculate the mean WBC count from the two chambers
	23.1.11 Calculate the number of cells in 1 μL of blood
	23.1.12 Report the findings

Checklist 24: Performing differential White Blood Cells count in thin blood film

Skills	
Standard	**Criteria**
24.1 Preparation of thin blood film for identification of white blood cells	24.1.1 Wear PPE
	24.1.2 Place a clean glass slide on a flat surface
	24.1.3 Mix fresh EDTA anticoagulated blood sample
	24.1.4 Dispense a small drop of blood onto the slide
	24.1.5 Spread the drop of blood using a spreading slide
	24.1.6 Examine to see if the smear is satisfactory
	24.1.7 Air dry the smear
	24.1.8 Fix the smear
24.2 Staining thin blood film using Leishman/Wright stain according to SOP	24.2.1 Flood slide with the stain
	24.2.2 Add buffered water onto the stain
	24.2.3 Rinse with a stream of tap or distilled water
	24.2.4 Wipe the back of the slide clean
	24.2.5 Air dry the smear
	24.2.6 Assess the quality of staining

Skills	
Standard	**Criteria**
24.3 Counting White Blood Cells	24.3.1 Examine the smear microscopically
	24.3.2 Count white blood cells using differential cell counter
	24.3.3 Report the findings

Checklist 25: Performance of Hb estimation

Skills	
Standard	**Criteria**
25.1 Performing Hb estimation ($CuSO_4$)	25.1.1 Wear PPE
	25.1.2 Prepare a fresh copper sulphate working solution
	25.1.3 Standardize the working solution
	25.1.4 Dispense a drop of whole blood into the solution
	25.1.5 Observe sinking of the blood drop
	25.1.6 Report the findings
25.2 Performing Hb estimation by Photometry (hemoglobinometer)	25.2.1 Wear PPE
	25.2.2 Collect whole blood using microcuvette
	25.2.3 Put microcuvette into hemoglobin analyzer
	25.2.4 Read and report the results

Checklist 26: Performance of ABO cell grouping

Skills	
Standard	**Criteria**
26.1 Performing ABO cell grouping (tile method)	26.1.1 Wear PPE
	26.1.2 Wash red blood cells in normal saline
	26.1.3 Prepare a red blood cells suspension
	26.1.4 Make squares on an opal tile using grease pencil
	26.1.5 Dispense ABO antisera in respective labelled squares
	26.1.6 Dispense washed red blood cells onto antisera reagents
	26.1.7 Mix the sera and red cells
	26.1.8 Observe for agglutination
	26.1.9 Report on the findings
26.2 Performing ABO cell grouping (tube method)	26.2.1 Wear PPE
	26.2.2 Wash red blood cells in normal saline

Skills	
Standard	**Criteria**
	26.2.3 Prepare a red blood cells suspension
	26.2.4 Label test tubes appropriately
	26.2.5 Dispense ABO antisera in respective labelled tubes
	26.2.6 Dispense washed red blood cells into antisera reagents
	26.2.7 Centrifuge the mixture
	26.2.8 Observe for agglutination
	26.2.9 Report on the findings

Checklist 27: Performance of ABO serum blood grouping

Skills	
Standard	**Criteria**
27.1 Performing ABO serum blood grouping (tile method)	27.1.1 Wear PPE
	27.1.2 Wash known A, B and O cells in normal saline
	27.1.3 Prepare suspensions of known A, B and O cells
	27.1.4 Make squares on an opal tile using grease pencil
	27.1.5 Dispense known cells in respective labelled squares
	27.1.6 Dispense test serum onto the red cell suspensions on the tile
	27.1.7 Mix the test serum and red cells
	27.1.8 Observe for agglutination
	27.1.9 Report on the findings
27.2 Performing ABO serum blood grouping (tube method)	27.2.1 Wear PPE
	27.2.2 Wash known A, B and O cells in normal saline
	27.2.3 Prepare suspensions of known A, B and O cells
	27.2.4 Label test tubes appropriately
	27.2.5 Dispense known cells in respective labelled tubes

Skills	
Standard	**Criteria**
	27.2.6 Dispense test serum into the red cell suspensions
	27.2.7 Centrifuge the mixtures
	27.2.8 Observe for agglutination
	27.2.9 Report on the findings

Checklist 28: Performance of Rhesus blood grouping

Skills	
Standard	**Criteria**
28.1 Performing Rhesus blood grouping	28.1.1 Wear PPE
	28.1.2 Wash red blood cells in normal saline
	28.1.3 Label test tube appropriately
	28.1.4 Dispense anti-D antisera into labelled test tube
	28.1.5 Add red blood cells into the tube
	28.1.6 Centrifuge the mixture
	28.1.7 Observe for agglutination
	28.1.8 Report on the findings

Checklist 29: Performance of compatibility test

Skills	
Standard	**Criteria**
29.1 Performing compatibility test (at room temperature)	29.1.1 Wear PPE
	29.1.2 Wash donor cells in normal saline
	29.1.3 Prepare a suspension of donor cells
	29.1.4 Label test tube appropriately
	29.1.5 Dispense patient serum into the labelled tube
	29.1.6 Dispense washed donor cells into patient serum
	29.1.7 Centrifuge the mixture
	29.1.8 Observe for agglutination or hemolysis both macroscopically and microscopically
	29.1.9 Report the findings
29.2 Performing compatibility test by tube method (at 37^{o}C incubation)	29.2.1 Incubate the mixture from step 29.1.6
	29.2.2 Centrifuge the mixture
	29.2.3 Observe for agglutination or hemolysis both macroscopically and microscopically

Skills	
Standard	**Criteria**
	29.2.4 Report the findings

Practicum Module: MLT05208 Medical Microbiology and Immunology

Total Practical Time: 40 hours in 20 weeks of a semester

Aim: The goal of this practicum is for students to acquire appropriate competencies related to Microbiology and Immunology in performing laboratory investigations

Practical Learning Outcome

By the end of practicum, students are expected to be able to:

- Apply skills of microbiological techniques to investigate diseases in the laboratory

Competencies/Skills

- Prepare skin snip for ZN cold technique
- Collect skin scraping, hair and nails for detection of fungal element
- Perform hot ZN staining technique
- Perform cold ZN staining technique
- Perform Auramine staining technique
- Perform 10% KOH technique for detection of fungal elements
- Perform hanging drop technique for detection of Vibrio cholerae
- Perform Gram Stain technique for differentiation of micro-organisms
- Perform wet preparation technique for detection of bacteria, yeast and pus cells in specimens
- Perform simple staining techniques (Methylene blue stain)

- Perform negative staining technique (India Ink, Nigrosine)
- Perform Cryptococcal antibody test in serum with the latex method
- Perform Helicobacter pylori antibody/antigen tests

Practicum resources

- Practical procedure book
- Checklists
- Laboratory rotation plan
- Practical assignment sheets
- All necessary working tools/supplies

Prerequisites

None

Practical placement

During the practical placement in the laboratory, students will have opportunity to observe, practice and acquire different skills relating to Medical Microbiology and Immunology

Activity 1: Preparing Skin Snip for ZN Cold Technique
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to prepare skin snip for ZN cold technique

Assignment
Prepare skin snip for ZN cold technique individually under practical instructor supervision

Activity 2: Performing Collection of skin scraping, hair and nails for detection of fungal element
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to collect skin scraping, hair and nails for detection of fungal element

Assignment
Collect skin scraping, hair and nails for detection of fungal element individually under practical instructor supervision

Activity 3: Performing hot ZN Staining Technique
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to Perform hot ZN Staining Technique

Assignment
Perform hot ZN Staining Technique individually under practical instructor supervision

Activity 4: Performing cold ZN staining technique

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform cold ZN staining technique

Assignment

Perform cold ZN staining technique individually under practical instructor supervision

Activity 5: Performing Auramine Staining Technique

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Auramine staining technique

Assignment

Perform Auramine staining technique individually under practical instructor supervision

Activity 6: Performing 10% KOH Technique for detection of fungal elements

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform 10% KOH technique for detection of fungal elements

Assignment

Perform 10% KOH technique for detection of fungal elements individually under practical instructor supervision

Activity 7: Performing hanging drop technique for detection of Vibrio cholerae

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform hanging drop technique for detection of Vibrio cholerae

Assignment

Perform hanging drop technique for detection of Vibrio cholera individually under practical instructor supervision

Activity 8: Performing Gram Stain Technique for differentiation of micro-organisms

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Gram Stain Technique for differentiation of micro-organisms

Assignment

Perform Gram Stain Technique for differentiation of micro-organisms individually under practical instructor supervision

Activity 9: Performing Wet Preparation Technique for detection of bacteria, yeast and pus cells in specimens

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Wet preparation technique for detection of bacteria, yeast and pus cells

Assignment

Perform Wet preparation technique for detection of bacteria, yeast and pus cells individually under practical instructor supervision

Activity 10: Perform Simple Staining Techniques using Methylene blue stain

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Methylene blue staining

Assignment

Perform Methylene blue staining individually under practical instructor supervision

Activity 11: Perform Negative Staining Technique (India Ink)

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform India Ink staining

Assignment

Perform India Ink staining individually under practical instructor supervision

Activity 12: Perform Cryptococcal Antibody Test in serum with the latex method

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Cryptococcal antibody test in serum with the latex method

Assignment

Perform Cryptococcal antibody test in serum with the latex method individually under practical instructor supervision

Activity 13: Perform Helicobacter pylori Antibody/Antigen Tests

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Helicobacter pylori Antibody/Antigen tests

Assignment

Perform Helicobacter pylori Antibody/Antigen tests individually under practical instructor supervision

End of Practicum Assignment

At the end of the Medical Microbiology and Immunology practical placement, you will be required to write a report on skills you practised. The report shall be submitted to the tutor for plenary presentation and feedback.

Monitoring and Evaluation

Practical instructors and tutors will make daily observations of students, provide support and document progress according to practicum competencies, and using checklists provided. The Practical instructors and tutors will give timely feedback for student's improvement. The report shall be assessed then immediate feedback shall be given to the student

Checklist 30: Preparation of skin snip for ZN cold technique

Skills	
Standard	**Criteria**
30.1 Preparing skin snip for ZN cold technique	30.1.1 Wear PPE
	30.1.2 Clean area where smear will be taken
	30.1.3 Pinch the skin tightly until it becomes pale due to blood loss
	30.1.4 Use a sterile blade to make a small cut
	30.1.5 Blot away blood with cotton wool
	30.1.6 Scrape firmly with blunt side of blade along the edges and bottom of the cut to collect specimen
	30.1.7 Transfer specimen to a clean slide and make a smear
	30.1.8 Cover the cut with a dressing

Checklist 31: Collection of skin scrapping, hair and nails specimen

Skills	
Standard	**Criteria**
31.1 Collecting skin scraping for detection of fungal element	31.1.1 Wear PPE
	31.1.2 Scrape the infected skin with a sterile surgical blade or razor blade
	31.1.3 Collect the scraping on a piece of clean paper or in a container
31.2 Collecting hair and nails specimen	31.2.1 Wear PPE
	31.2.2 Cut a piece of infected material and collects it on a piece of clean paper or in a container

Checklist 32: Performance of Hot ZN staining technique

Skills	
Standard	**Criteria**
32.1.1 Performing hot ZN staining technique	32.1.1 Wear PPE
	32.1.2 Smear the specimen on the slide and leave it to dry
	32.1.3 Fix the smear
	32.1.4 Apply primary stain
	32.1.5 Heat each slide from below until steam rises
	32.1.6 Leave the heated stain on the slides for the recommended time
	32.1.7 Wash off the stain with clean water
	32.1.8 Decolorize the smear
	32.1.9 Wash well with clean water
	32.1.10 Apply counter stain
	32.1.11 Wash off the stain with clean water.
	32.1.12 Wipe the back of the slide clean
	32.1.13 Examine the smear microscopically
	32.1.14 Report on the findings

Checklist 33: Performance of cold ZN staining technique

Skills	
Standard	**Criteria**
33.1 Performing cold ZN staining technique	33.1.1 Wear PPE
	33.1.2 Smear the specimen on the slide and leave it to air dry
	33.1.3 Fix the smear
	33.1.4 Apply primary stain
	33.1.5 Wash with clean water
	33.1.6 Decolorize the smear
	33.1.7 Wash with clean water
	33.1.8 Apply counter stain
	33.1.9 Wash with clean water
	33.1.10 Wipe the back of the slide clean
	33.1.11 Examine the smear microscopically
	33.1.12 Report the findings

Checklist 34: Performance of Auramine staining technique

Skills	
Standard	**Criteria**
	34.1.1 Wear PPE

Skills	
Standard	**Criteria**
34.1 Performing Auramine staining technique	34.1.2 Smear the specimen on the slide and leave it to air dry
	34.1.3 Fix the smear
	34.1.4 Apply Auramine stain
	34.1.5 Wash with clean water
	34.1.6 Decolorize the smear
	34.1.7 Wash with clean water
	34.1.8 Cover the smear with the potassium permanganate solution
	34.1.9 Wash with clean water
	34.1.10 Wipe the back of the slide clean
	34.1.11 Examine the smear microscopically
	34.1.12 Report the findings

Checklist 35: Performance of 10% KOH technique for detection of fungal elements

Skills	
Standard	**Criteria**
35.1 Performing 10% KOH technique for detection of fungal elements	35.1.1 Wear PPE
	35.1.2 Place the specimen on the slide
	35.1.3 Add a drop of 10% KOH
	35.1.4 Place a cover glass over the drop
	35.1.5 Seal the edge with Vaseline
	35.1.6 Incubate the preparation
	35.1.7 Examine the preparation microscopically
	35.1.8 Report the findings

Checklist 36: Performance of hanging drop technique for detection of Vibrio cholerae

Skills	
Standard	**Criteria**
36.1 Performing hanging drop technique for detection of Vibrio cholera	36.1.1 Wear PPE
	36.1.2 Make a ring of plasticine or Vaseline on the centre of the slide
	36.1.3 Transfer a specimen to the centre of the cover slip
	36.1.4 Press the ring of Vaseline or plasticine on to the cover slip
	36.1.5 Invert the slide so that the cover slip is uppermost.
	36.1.6 Examine the preparation microscopically
	36.1.7 Report the findings

Checklist 37: Performance of Gram Stain technique

Skills	
Standard	Criteria
37.1 Performing Gram Stain technique	37.1.1 Wear PPE
	37.1.2 Smear the specimen on the slide and leave it to air dry
	37.1.3 Fix the smear
	37.1.4 Apply the primary stain
	37.1.5 Wash with a stream of water
	37.1.6 Flood the slide with mordant
	37.1.7 Wash with a stream of water
	37.1.8 Decolourize the smear
	37.1.9 Wash with a stream of water
	37.1.10 Counterstain the smear
	37.1.11 Wash with a stream of water
	37.1.12 Examine the smear microscopically
	37.1.13 Report the findings

Checklist 38: Performance of wet preparation technique for detection of bacteria, yeast and pus cells

Skills	
Standard	**Criteria**
38.1 Performing wet preparation technique for detection of bacteria, yeast and pus cells in specimens	38.1.1 Wear PPE
	38.1.2 Put a drop of normal saline on a clean glass slide
	38.1.3 Emulsify the specimen to be examined and make homogeneous suspension
	38.1.4 Place a cover glass over the drop
	38.1.5 Examine the preparation microscopically
	38.1.6 Report the cells observed

Checklist 39: Performance of simple staining technique by using Methylene blue stain

Skills	
Standard	**Criteria**
39.1 Performing Methylene blue staining	39.1.1 Wear PPE
	39.1.2 Smear the specimen on slide and leave it to air dry
	39.1.3 Fix the smear
	39.1.4 Flood the smear with methylene blue
	39.1.5 Wash with a stream of water
	39.1.6 Leave the smear to air dry
	39.1.7 Examine the smear microscopically
	39.1.8 Report the findings

Checklist 40: Performance of negative staining technique using India ink

Skills	
Standard	**Criteria**
40.1 Performing negative staining technique (India Ink)	40.1.1 Wear PPE
	40.1.2 Place India ink near one end of a clean glass slide
	40.1.3 Emulsify a small portion of solid bacteria culture in the drop of ink, or mix a loopful of liquid culture
	40.1.4 Use another clean slide to spread the drop of stain containing the organism and make a thin film
	40.1.5 Allow the smear to air dry
	40.1.6 Examine the smear microscopically
	40.1.7 Report the findings

Checklist 41: Performing Cryptococcal antibody test in serum with the latex method

Skills	
Standard	**Criteria**
41.1 Perform Cryptococcal antibody test in serum with the latex method	41.1.1 Wear PPE
	41.1.2 Add serum to Pronase
	41.1.3 Incubate serum/Pronase mixture
	41.1.4 Terminate enzymatic digestion by adding Pronase inhibitor or boiling the solution
	41.1.5 Add serum/Pronase mixture onto a ring slide
	41.1.6 Add Cryptococcal Latex reagent to the ring
	41.1.7 Use applicator stick to thoroughly mix the contents of the ring
	41.1.8 Rotate the mixture and observe for latex agglutination
	41.1.9 Report the findings

Checklist 42: Performing Helicobacter pylori antibody test

Skills	
Standard	**Criteria**
42.1 Perform Helicobacter pylori antibody test	42.1.1 Wear PPE
	42.1.2 Remove the test kit from its sealed pouch
	42.1.3 Transfer sample (serum/plasma) to the sample pad of the device
	42.1.4 Wait for the coloured band(s) to appear.
	42.1.5 Report the findings

Checklist 43: Performance of Helicobacter pylori antigen test

Skills	
Standard	**Criteria**
43.1 Performing Helicobacter pylori antigen test	43.1.1 Wear PPE
	43.1.2 Sample the stool specimen and put it into a stool collection device
	43.1.3 Shake the stool collection device vigorously
	43.1.4 Remove the test kit from its sealed pouch
	43.1.5 Dispense the solution into the sample well of the test device
	43.1.6 Wait for the coloured band(s) to appear
	43.1.7 Report the findings

Practicum Module: MLT05209 Clinical Chemistry

Total Practical Time: 30hours in 20 weeks of a semester

Aim: The goal of this practicum is for students to acquire appropriate competencies related to Clinical Chemistry in performing Laboratory Investigations

Practical Learning Outcome

By the end of practicum, students are expected to be able to:

- Apply skills of Clinical Chemistry in diagnosis of diseases

Competencies/Skills

- Perform Pandy's Test to determine protein in CSF
- Perform Coomassie Brilliant Blue method to determine protein in CSF
- Perform Biurrette Method to determine total protein in ascetic fluid, pleural fluid and serum
- Perform Bromol Cresol Green for serum/plasma albumin
- Perform Protein Testing in urine by using 20% Sulphosalcylic Acid
- Perform Fouchest Test to determine bilirubin in urine
- Perform Glucose Oxidase/Hexokinase Test to determine glucose in serum/plasma, pleura and ascitic fluid

Practicum resources

- Practical procedure book
- Checklists
- Laboratory rotation plan
- Practical assignment sheets
- All necessary working tools/supplies

Prerequisites

None

Practical placement

During the practical placement in the laboratory, students will have opportunity to observe, practice and acquire different skills relating to Clinical chemistry

Activity 1: **Performing Pandy's Test to determine protein in CSF**

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Pandy's test

Assignment

Perform Pandy's test individually under practical instructor supervision

Activity 2: Perform Coomassie Brilliant Blue method to determine protein in CSF

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Coomassie Brilliant Blue method

Assignment
Perform Coomassie Brilliant Blue method individually under practical instructor supervision

Activity 3: Perform Biurrette method to determine total protein in ascetic fluid, pleural fluid and serum
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Biurrette test

Assignment
Perform Biurrette test individually under practical instructor supervision

Activity 4: Perform Bromol Cresyl Green for serum/plasma albumin
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Bromol Cresyl Green test

Assignment
Perform Bromol Cresol Green test individually under practical instructor supervision

Activity 5: Perform Protein testing in urine by using (20%) Sulphosalcylic Acid

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Protein testing in urine by using (20%) Sulphosalcylic Acid

Assignment

Perform Protein testing in urine by using (20%) Sulphosalcylic Acid individually under practical instructor supervision

Activity 6: Perform Fouchest Test to determine bilirubin in urine

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Fouchest Test

Assignment

Perform Fouchest Test individually under practical instructor supervision

Activity 7: Perform Glucose Oxidase/Hexokinase Test to determine glucose in serum/plasma, pleura and ascitic fluid

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Glucose Oxidase/Hexokinase test

Assignment

Perform Glucose Oxidase/Hexokinase test individually under practical instructor supervision

End of Practicum Assignment

At the end of the Clinical Chemistry practical placement, you will be required to write a report on skills you practised. The report shall be submitted to the tutor for plenary presentation and feedback.

Monitoring and Evaluation

Practical instructors and tutors will make daily observations of students, provide support and document progress according to practicum competencies, and using checklists provided. The Practical instructors and tutors will give timely feedback for student's improvement. The report shall be assessed then immediate feedback shall be given to the student

Checklist 44: Performance of Pandy's test

Skills	
Standard	**Criteria**
44.1 Performing Pandy's test	44.1.1 Put Phenol in a labelled tube
	44.1.2 Add CSF sample
	44.1.3 Mix and observe for cloudiness against a dark background
	44.1.4 Report the findings

Checklist 45: Performace of Coomassie brilliant blue method

Skills	
Standard	**Criteria**
45.1.Performing Coomassie brilliant blue method	45.1.1 Wear PPE
	45.1.2 Label the test tubes
	45.1.3 Mix reagent with sample, standard and controls
	45.1.4 Incubate the mixtures
	45.1.5 Select a proper filter
	45.1.6 Zero the colorimeter
	45.1.7 Read absorbances of the preparations
	45.1.8 Calculate the concentrations

Skills	
Standard	**Criteria**
	45.1.9 Report the findings

Checklist 46: Performance of Biurrette test

Skills	
Standard	**Criteria**
46.1 Performing Biurrette test	46.1.1 Wear PPE
	46.1.2 Label the test tubes
	46.1.3 Mix reagent with sample, standard and controls
	46.1.4 Incubate the mixtures
	46.1.5 Select a proper filter
	46.1.6 Zero the colorimeter
	46.1.7 Read absorbances of the preparations
	46.1.8 Calculate the concentrations
	46.1.9 Report the findings

Checklist 47: Performance of bromol cresyl green for serum/plasma albumin

Skills	
Standard	**Criteria**
47.1 Performing bromol cresyl green for serum/plasma albumin	47.1.1 Wear PPE
	47.1.2 Label the test tubes
	47.1.3 Mix reagent with sample, standard and controls
	47.1.4 Incubate the mixtures
	47.1.5 Select a proper filter
	47.1.6 Zero the colorimeter
	47.1.7 Read absorbances of the preparations
	47.1.8 Calculate the concentrations
	47.1.9 Report the findings

Checklist 48: Performance of protein in urine by using (20%) sulphosalcylic acid

Skills	
Standard	**Criteria**
48.1 Performing protein in urine by using (20%) sulphosalcylic acid	48.1.1 Wear PPE
	48.1.2 Add clear urine into labelled tubes
	48.1.3 Use pH paper to test the reaction of urine
	48.1.4 Add sulphosalicylic acid into the tube for test
	48.1.5 Hold the tubes against a dark background and examine for cloudiness
	48.1.6 Report the findings

Checklist 49: Performance of Fouchest test

Skills	
Standard	**Criteria**
49.1 Performing Fouchest test	49.1.1 Wear PPE
	49.1.2 Add urine a labelled tube
	49.1.3 Add barium chloride into the tube
	49.1.4 Mix well and filters through filter paper
	49.1.5 Unfold paper on an absorbent paper
	49.1.6 Add Fouchest reagent
	49.1.7 Report the findings

Checklist 50: Performance of glucose oxidase/hexokinase test

Skills	
Standard	**Criteria**
50.1 Performing glucose oxidase/hexokinase test	50.1.1 Wear PPE
	50.1.2 Label the test tubes
	50.1.3 Mix reagent with sample, standard and controls
	50.1.4 Incubate the mixtures
	50.1.5 Select a proper filter
	50.1.6 Zero the colorimeter
	50.1.7 Read absorbances of the preparations
	50.1.8 Calculate the concentrations
	50.1.9 Report the findings

Practicum Module: MLT05210 Medical Parasitology

Total Practical Time: 30 hours in 20 weeks of a semester

Aim: The goal of this practicum is for students to acquire appropriate competencies related to Medical Parasitology in performing laboratory investigations

Practical Learning Outcome

By the end of practicum, students are expected to be able to:

- Apply parasitological techniques in diseases diagnosis

Competencies/Skills

- Prepare Thick Blood Smear for investigation of blood parasites according to SOP
- Perform Giemsa Staining Technique for identification of parasite (counting method of Plasmodium spp; quantitatively MPS/WBC and MPS/micro litre)
- Perform Buffy Coat Techniques for identification of motile blood parasites
- Perform Wet Preparation Technique for investigation of intestinal parasite
- Perform Formal Ether Concentration technique for investigation of intestinal parasite
- Perform Urine Wet Preparation Technique for investigation of urinary parasites
- Perform Urine Wet Preparation Technique for cell counting (e.g., RBCs, WBCs, Epithelial cells etc.)

Practicum resources

- Practical procedure book
- Checklists
- Laboratory rotation plan
- Practical assignment sheets
- All necessary working tools/supplies

Prerequisites

None

Practical placement

During the practical placement in the laboratory, students will have opportunity to observe, practice and acquire different skills relating to Medical Parasitology

Activity 1: Preparation of Thick Blood Smear for investigation of blood parasites

During practical session in the laboratory you will be divided in small manageable groups and be assigned to prepare thick blood smear

Assignment

Prepare thick blood smear individually under practical instructor supervision

Activity 2: Performing Giemsa Staining Technique
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Giemsa staining technique

Assignment
Perform Giemsa staining technique individually under practical instructor supervision

Activity 3: Performing Buffy Coat Technique
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Buffy Coat technique

Assignment
Perform Buffy Coat technique individually under practical instructor supervision

Activity 4: Performing Wet Preparation Technique for investigation of intestinal parasite
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform wet preparation technique for investigation of intestinal parasite

Assignment
Perform wet preparation technique for investigation of intestinal parasite individually under practical instructor supervision

Activity 5: Performing Formal Ether Concentration Technique

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform Formal Ether concentration technique

Assignment

Perform Formal Ether concentration technique individually under practical instructor supervision

Activity 6: Perform Urine Wet Preparation Technique for investigation of urinary parasites

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform urine wet preparation technique for investigation of urinary parasites

Assignment

Perform urine wet preparation technique for investigation of urinary parasites individually under practical instructor supervision

Activity 7: Perform Urine Wet Preparation Technique for cell counting

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to perform urine wet preparation technique for cell counting

Assignment

Perform urine wet preparation technique for cell counting individually under practical instructor supervision

End of Practicum Assignment
At the end of the Medical Parasitology practical placement, you will be required to write a report on skills you practised. The report shall be submitted to the tutor for plenary presentation and feedback.

Monitoring and Evaluation

Practical instructors and tutors will make daily observations of students, provide support and document progress according to practicum competencies, and using checklists provided. The Practical instructors and tutors will give timely feedback for student's improvement. The report shall be assessed then immediate feedback shall be given to the student

Checklist 51: Preparation of thick blood smear for investigation of blood parasites

Skills	
Standard	**Criteria**
51.1 Preparing thick blood smear for investigation of blood parasites	51.1.1 Wear PPE
	51.1.2 Place a small drop of blood on a labelled slide
	51.1.3 Spread the drop of blood using an applicator stick
	51.1.4 Allow the blood to air-dry

Checklist 52: Performance of Giemsa staining technique

Skills	
Standard	**Criteria**
52.1 Performing Giemsa staining technique	52.1.1 Wear PPE
	52.1.2 Place a dry blood smear on a staining rack
	52.1.3 Flood the smear with Giemsa stain and leave it for the recommended time
	52.1.4 Wash off the stain using clean water

Skills	
Standard	**Criteria**
	52.1.5 Wipe the back of each slide clean and place it in a draining rack for the preparation to air-dry
	52.1.6 Examine the smear microscopically
	52.1.7 Quantify malaria parasites per 200 or 500 WBCs
	52.1.8 Quantify malaria parasites per µL

Checklist 53: Performance of Buffy coat technique

Skills	
Standard	**Criteria**
53.1 Performing Buffy coat technique	53.1.1 Wear PPE
	53.1.2 Fill ¾ of the capillary tube with the blood sample
	53.1.3 Seal one end of capillary tube
	53.1.4 Centrifuge the capillary tube with it's contents
	53.1.5 Examine the preparation microscopically
	53.1.6 Report the finding

Checklist 54: Performing wet preparation technique for investigation of intestinal parasite

Skills	
Standard	**Criteria**
54.1 Performing wet preparation technique for investigation of intestinal parasite using normal saline solution	54.1.1 Wear PPE
	54.1.2 Place a drop of normal saline on a clean glass slide
	54.1.3 Remove a small portion of specimen with applicator stick and mix it with saline drop
	54.1.4 Place a cover glass over the drop
	54.1.5 Examine the preparation microscopically
	54.1.6 Report the finding
54.2 Performing wet preparation technique for investigation of intestinal parasite using iodine solution	54.2.1 Wear PPE
	54.2.2 Place a drop of iodine solution on the centre of a clean glass slide
	54.2.3 Remove a small portion of specimen with applicator stick and mix it with iodine solution drop
	54.2.4 Place a cover glass over the drop
	54.2.5 Examine the preparation microscopically

Skills	
Standard	**Criteria**
	54.2.6 Report the findings

Checklist 55: Performance of Formal ether/acetone concentration technique

Skills	
Standard	**Criteria**
55.1 Performing Formal ether/acetone concentration technique	55.1.1 Wear PPE
	55.1.2 Emulsify the stool specimen
	55.1.3 Mix the specimen with 10% formalin
	55.1.4 Sieve the emulsified stool, collecting the sieved suspension in a beaker.
	55.1.5 Transfer the suspension to a conical flask and add diethyl ether
	55.1.6 Mix the contents of the flask
	55.1.7 Centrifuge the mixture
	55.1.8 Discard the ether, faecal debris, and formal water
	55.1.9 Resuspend and mix the sediment
	55.1.10 Transfer the sediment to a slide, and cover with a cover glass.
	55.1.11 Examine the preparation microscopically
	55.1.12 Report the finding

Checklist 56: Performance of urine wet preparation technique for investigation of urinary parasites

Skills	
Standard	**Criteria**
56.1 Performing urine wet preparation technique for investigation of urinary parasites	56.1.1 Wear PPE
	56.1.2 Add urine specimen into a Falcon tube
	56.1.3 Centrifuge the specimen
	56.1.4 Remove the supernatant and resuspend deposits
	56.1.5 Dispense a drop of the deposits onto a clean glass slide
	56.1.6 Place a cover glass over the drop
	56.1.7 Examine the preparation microscopically
	56.1.8 Report the findings

Checklist 57: Performing urine wet preparation technique for cell counting

Skills	
Standard	**Criteria**
57.1 Performing urine wet preparation technique for cell counting	57.1.1 Wear PPE
	57.1.2 Add urine specimen into a Falcon tube
	57.1.3 Centrifuge the specimen
	57.1.4 Remove the supernatant and resuspend deposits
	57.1.5 Dispense a drop of the deposits onto a clean glass slide
	57.1.6 Place a cover glass over the drop
	57.1.7 Examine the preparation microscopically
	57.1.8 Report the findings in cell/HPF

Practicum Module: MLT05211 Cytology and Histology

Total Practical Time: 20 hours in 20 weeks of a semester

Aim: The goal of this practicum is for students to acquire appropriate competencies related to Cytological and Histological Techniques in performing laboratory investigations

Practical Learning Outcome

By the end of practicum, students are expected to be able to:

- Apply Cytological and Histological Techniques in specimen fixation for laboratory investigations
- Apply knowledge of Histology and Cytology in transporting specimen for laboratory investigations

Competencies/Skills

- Fix histological tissue specimen using 10% formalin, 95% alcohol and 50:50 ether-ethanol
- Fix cytological smear using vapor, liquids and air drying
- Transport cytological and histological specimen according to guidelines

Practicum resources

- Practical procedure book
- Checklists
- Laboratory rotation plan
- Practical assignment sheets
- All necessary working tools/supplies

Prerequisites
None

Practical placement
During the practical placement in the laboratory, students will have an opportunity to observe, practice and acquire prescribed competencies relating to Cytology and Histology

Activity 1: Fixing histological tissue specimen
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to fix histological tissue specimen using 10% formalin, 95% alcohol and 50:50 ether-ethanol.

Assignment
Fix histological tissue specimen using 10% formalin, 95% alcohol and 50:50 ether-ethanol individually under practical instructor supervision

Activity 2: Fixing Cytological Smear
During practical session in the laboratory, you will be divided in small manageable groups and be assigned to fix cytological tissue specimen using vapor, liquids and air drying

Assignment

Fix cytological tissue specimen using vapor (formaldehyde, glutaraldehyde, acetaldehyde), liquids (95% alcohol and 50:50 ether-ethanol) and air drying individually under practical instructor supervision

Activity 3: Transporting Histological specimens

During practical session in the laboratory, you will be divided in small manageable groups and be assigned to transport histological and cytological specimens

Assignment

Demonstrate transportation of histological and cytological specimens individually under practical instructor supervision

End of Practicum Assignment

At the end of the Cytology and Histology practical placement, you will be required to write a report on skills you practised. The report shall be submitted to the tutor for plenary presentation and feedback.

Monitoring and Evaluation

Practical instructors and tutors will make daily observations of students, provide support and document progress according to practicum competencies, and using checklists provided. The Practical instructors and tutors will give timely feedback for student's improvement. The report shall be assessed then immediate feedback shall be given to the student

Checklist 58: Fixing histological tissue specimen

Skills	
Standard	**Criteria**
58.1 Fixation of histological tissue specimen	58.1.1 Wear PPE
	58.1.2 Choose appropriate histological container
	58.1.3 Put the correct volume of selected fixative in the histological bottle
	58.1.4 Label the histological container
	58.1.5 Immerse the tissue in the fixative
	58.1.6 Close the histological container
	58.1.7 Wash hands

Checklist 59: Preparation and Fixation of Cytological Smear

Skills	
Standard	**Criteria**
59.1 Preparing Cytological Smear	59.1.1 Wear PPE
	59.1.2 Centrifuge fluid sample
	59.1.3 Discard the supernatant
	59.1.4 Mix the deposits
	59.1.5 Label the microscope glass slide
	59.1.6 Use deposits to prepare a smear
59.2 Fixation of Cytological smear	59.2.1 Open up the container with fixative
	59.2.2 Immerse the prepared smears in the fixative
	59.2.3 Cover the cytological bottle with lid
	59.2.4 Leave the smear in the fixative for the

Skills	
Standard	**Criteria**
	recommended time
	59.2.5 Store the slide for microscopic examination

Checklist 60: Transporting Histological and Cytological Specimens

Skills	
Standard	**Criteria**
60.1 Triple packaging	60.1.1 Arrange all required material for triple packing
	60.1.2 Fill Laboratory Investigation Forms that corresponds to specimen to be transported
	60.1.3 Label the primary receptacle containing the specimen.
	60.1.4 Wrap the primary receptacle in absorbent material
	60.1.5 Enclose the primary receptacle in secondary receptacle

Skills	
Standard	**Criteria**
	60.1.6 Add absorbent material in secondary receptacle
	60.1.7 Attach the laboratory investigation form and accompanying documents outside of the secondary receptacle
	60.1.8 Place the secondary receptacle in an outer shipping package
	60.1.9 Attach specific hazard label(s) to the outer package
	60.1.10 Submit the package to courier

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