UTILIZATION AND CHALLENGES OF LABORATORY SERVICES IN NORTH OKKALAPA GENERAL AND TEACHING HOSPITAL

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Master of Hospital Administration (MHA)

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2019

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Thesis submitted to

the Postgraduate Academic Board of Studies

University of Public Health, Yangon

as the partial fulfillment of the requirements

for the Degree of Master of Hospital Administration (MHA)

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This thesis has been approved and passed by the Board of Examiners.

Chief Examiner

Examiner (1) **Examiner (2)**

ACKNOWLEDGEMENT

First of all, I would like to express my heartfelt gratitude and special thanks to Rector, Professor Dr. Hla Hla Win, Chairperson of Board of Studies of University of Public Health, Yangon and to the member of University of Public Health, Institutional Review Board for giving opportunity to conduct this study.

I would like to special thanks to Dr. Kyawt Sann Lwin, Professor and Head of Department of Health Policy and Management, Dr. Ko Ko Zaw, Professor and Head of Department of Epidemiology, Dr. Kyaw Swa Mya, Associate Professor and Head of Department of Biostatistics, University of Public Health for their kind permission and guidance in this study.

I am really indebted to my supervisor, Dr. Kay khine Aye mauk, Associate Professor, Department of Preventive and Social Medicine, University of Medicine (2) and my co-supervisor, Dr. Hla Nu Kyi, Associate Professor, Department of Public Health Laboratory Sciences, University of Public Health for their kind support, guidance and constructive criticism throughout the study.

I would like to express special thanks to Dr. Kyi Soe, Senior Medical Superintendent of North Okkalapa General and Teaching Hospital and Dr. Myint Myint Aye, Senior Medical Superintendent, Yangon General Hospital for their kind permission to study the 'utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital' and also for their guidance, support for this study.

Special thanks are extended to Dr. Myint Myint Than, Professor, Department of Pathology, North Okkalapa General and Teaching Hospital for their kind permission and help for data collection of my study.

Last, but not the least, I would like to extend so much thanks to patients and patient attendants, all doctors, nurses, laboratory technicians and all persons who encouraged and assisted me to complete the study in time.

ABSTRACT

A cross-sectional hospital-based study using mixed method was conducted to describe the utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital during August to November 2019. For quantitative data, secondary data were used by reviewing reports and records for year 2018 and 2019. For qualitative data, key informant interviews and in-depth interviews were also done. On finding, the total tests performed by both main and 24-hour laboratories in 2018 was (838,359) and average of (2,300) tests was done in a day. Among tests performed by each laboratory sections, half of the tests performed were biochemistry and one third by microbiology tests. In blood bank, a total of (28,870) units of blood was collected and majority of blood received from National Blood Center during 2018. From blood issue section, a total of (30,742) units of blood and blood components were utilized by different departments and average of (80) units were used daily. The proportion of inefficient use of laboratory tests at 24-hour laboratory section for the first six months of 2019 was 4.1% during these period. The findings from the interview of health staff revealed that there were many challenges such as insufficient human resources especially in laboratory technicians, no regular training to technicians, not a proper laboratory design of main laboratory buildings for prevention from different hazards and inadequate space and storage area for laboratory machines, equipment and reagent. There was sometime challenge in quality of laboratory service due to shortage of technicians that can affect laboratory turnaround time. Most patient's attendants mentioned the prolong waiting time at the sample and result collection process. Based on the findings, full sanction of human resources should be provided at laboratory and intensive refresher trainings and supportive facilities should be given to the laboratory technicians. Laboratory Information System (LIS) should be institutionalized to reduce waiting time for results and prevent unnecessary missing such as inefficient use of laboratory tests. The findings of this study can be used in supporting on determination of the needs of the laboratories, human resource development, building and infrastructure upgrading, implementation of LIS system, effective infection control and antibiotics stewardship program in hospital and may contribute next steps for strengthening policy.

CONTENTS

LIST OF ABBREVIATIONS

A & E	Accident and Emergency department
AFB	Acid Fast Bacilli
AFP	Alpha fetoprotein
AMR	Antimicrobial resistance
APTT	Activated Partial Thromboplastin Time
ASO	Anti-streptolysin O Antibody
BCR	Hepatitis B, Hepatitis C, Retroviral infection
BM	Bone Marrow examination
BT CT	Bleeding Time, Clotting Time
C & S	Culture and Sensitivity
CA 125	Cancer antigen 125
CA 153	Cancer antigen 153
CA 19-9	Carbohydrate antigen 19-9
CD4 count	Glycoprotein found on surface of T helper cells
CEA	Carcinoembryonic antigen
CI	Confidence Interval
Cl	Chloride
CMSD	Central Medical Stores Depot
CMU	Cardiac Medical Unit
CP	Complete blood picture
CRP	C- Reactive Protein
Cryo	Cryoprecipitate
CSF	Cerebrospinal fluid
DMS	Deputy Medical Superintendent
EQA	External Quality Assurance
ERC	Emergency Receiving Center
ESR	Erythrocyte Sedimentation Rate
FFP	Fresh Frozen Plasma
FNAC	Fine Needle Aspiration Cytology
FOC	Free of Charge
G6PD	Glucose-6-Phosphate Dehydrogenase
GGT	Gamma-glutamyl transferase enzyme

Hb	Hemoglobin
HbA1C	Hemoglobin A1C
HBsAg	Hepatitis B surface Antigen
HCO3	Bicarbonate
HCV Ab	Hepatitis C Virus Antibody
HIV Ab	Human Immunodeficiency Virus Antibody
IDI	In-Depth Interview
INR	International normalized ratio
K	Potassium
KII	Key Informant interview
LDH	Lactate Dehydrogenase test
LFT	Liver Function Test
LIMS	Laboratory Information Management System
LIS	Laboratory Information System
MF	Microfilaria
MOHS	Ministry of Health and Sports
MP	Malaria parasite
Na	Sodium
NBC	National Blood Center
NHL	National Health Laboratory
NOGTH	North Okkalapa General and Teaching Hospital
NPT	Naypyitaw
NSU	Neurosurgical Unit
OG	Obstetrics and Gynecology
OPD	Out-patient Department
PC	Packed Cell
PG	Post graduate
PM	Postmortem examination
PMCT	Prevention of Maternal and Child Transmission
PPP	Public Private partnership
PRP	Platelet Rich Plasma
PSA	Prostatic Specific Antigen
PT	Prothrombin Time

RA	Rheumatoid Arthritis
RE	Routine examination
SCBU	Special Care Baby Unit
SD	Standard Deviation
SMS	Senior Medical Superintendent
SOP	Standard Operating Procedure
SPSS	Statistical Package for Social Science
T & DP	Total and Differential Protein
T3	Triiodothyronine
T4	Thyoroxine
TFT	Thyroid Function Test
TSH	Thyroid Stimulating Hormone
TTI	Transfusion Transmissible Infection
VDRL	Venereal disease research laboratory test
WB	Whole Blood
WHO	World Health Organization
ZN stain	Ziehl-Neelsen stain

LIST OF TABLES

LIST OF FIGURES

CHAPTER (1)
INTRODUCTION

Clinical laboratory services are the greatest cost effective and also the lowest invasive source of information in making the clinical decision. Nowadays, the advance of new technologies in diagnosis of various infections provide great improvement in laboratory services. Clinical laboratories give information and services that contribute to the maximal effective delivery of care in health care system in a way that the correct test is performed on the right person, at right time, producing accurate test results which help the providers make the right diagnostic and therapeutic decisions using the right level of healthcare resources (WHO, 2011a).

A hospital laboratory service can be a high income generating service and an economic asset to the hospital. An efficient laboratory service can decrease the number of hospital admission to out-patients and the hospitalization time of admitted patients (Sakharkar, Kangueane and Mathura, 2007).

Healthcare budgets worldwide are faced with increasing pressure to decrease costs while maintaining quality. The laboratories are often targeted as a core in controlling health expenditure (Meidani et al., 2016).

1.1 Background information

The laboratory services provide the vital support for the prevention, control and treatment of disease and other related health care programme being carried out in Myanmar in the context of the National Health Plan.

Laboratory services are an integral component of a comprehensive health-care system. They provide the required diagnostic support to curative and preventive health services, health promotion activities and research. These are essential to guide appropriate treatment and rational use of essential drugs, and for surveillance and control of diseases of public health concern. Laboratory services may be used effectively at every level of health care including the primary level, where many common diseases and diseases with outbreak potential may be diagnosed using basic laboratory tests.

The reliable and timely results from laboratory investigations are crucial elements for decision-making in almost all aspects of clinical health care, and are

essential for the surveillance and diseases control of public health importance. Early disease recognition also improves the accuracy of health information and ensures effective national health planning. However, laboratory services are often fragmented, accorded low priority and even worsened by inadequate allocation of resources (WHO, 2011a).

By using laboratory information, physicians and other health care professionals can make appropriate evidence-based diagnostic or therapeutic decisions for their patients. Clinical laboratory services have a direct impact on many aspects of patient care. When diagnostic laboratory testing is used appropriately and judiciously, besides leading to a better clinical decision making, it reduces the overall cost of treating a patient. All levels of the public health infrastructure including disease control and prevention, environmental health, epidemiology, emergency preparedness and response are a key linked to public health laboratories. Health priorities and policies in the country base on the data generated from laboratories (WHO, 2003).

The accurate and reliable clinical laboratory testing is an important component of a public health approach to disease management in resource-limited settings. Laboratory data are essential if clinicians are accurately assessed the status of patient's health, made an accurate diagnosis, formulated treatment plans and continuously monitored the effects of treatment. The clinician must be relied on the laboratory's test results if they are to use them for clinical care. The results must be accurate, reliable, and timely (WHO, 2003).

North Okkalapa General Hospital is a (800) bed teaching hospital and there are four major general units and twenty-nine specialty units. Pathology department is one of the diagnostic departments of NOGTH. The clinical laboratory of NOGTH is a type A laboratory and it was gradually upgraded the quality to meet the changing demand of Emergency Receiving Center (ERC), inpatients wards and General and Specialist OPD for out-patients. The functions of the pathology department include an office hour laboratory service, 24-hour laboratory service and blood bank service.

In Myanmar, laboratory facilities are generally graded into (3), types A, B and C with the National Health Laboratory as the central reference laboratory. Type A laboratories work for the States and the Regional level, Type B at the District level and Type C at the Township level.

Type (A) laboratories are generally leaded by consultant pathologists who look after microbiology, clinical chemistry, hematology, and blood banking. They serve hospitals with a bed strength of 200 and above (State and Regional level).

Type (B) laboratories are headed by medical technologist. They are carried out services in clinical chemistry, microbiology, hematology and blood banking. The hospital served by type B laboratories has a bed -strength of 100-150.

Type (C) laboratories are carried out the tests classified under essential clinical chemistry, essential hematology, public health microbiology and blood banking. The number of hospital bed served by these laboratories is generally 16 to 50. International training on quality assurance has been carried out from time to time in Myanmar (WHO, 2003).

1.2 Problem Statement

Laboratory services are needed to be fully integrated as a core component of health systems. Few countries have clearly defined the role of laboratory services at each level of the health care services. Most countries are unaware of what laboratory services are being offered to the population in terms of types of tests and their quality. As a results, national planning for laboratory personnel and support services are weak. The lack of a sector-wide approach, including laboratory services and health services as a whole, is an important challenge to be addressed. This complex web of constraints resulted in continued reliance on empirical patient care, often leading to misdiagnosis and inappropriate treatment and increasing the risk of poor patient outcomes, drug resistance and waste of already scarce resource (WHO, 2016).

1.3 Justification

Laboratory services are an integral part of health care services worldwide. In tropical countries, laboratory services are particularly useful at the primary health care level due to the nature of the commonly presenting diseases and conditions, most of which may be diagnosed using simple laboratory tests (Saliki, 2006).

Laboratory services whose results are the basis of 60%-70% of important clinical decisions suffer from fragmentation. Laboratory services fragmentation induces problems such as non-accountability for costs and quality, not being patient-centered and unsustainability of services in long run. Therefore, health systems consider laboratory services integration in an unavoidable way (Mouseli et al., 2018).

Laboratory services can detect the new antimicrobial resistance outbreaks of infectious diseases, emerging diseases and a possible bioterrorism event.

Establishment of antimicrobial resistance surveillance reported in the form of antibiogram, gave decisions for empiric antimicrobial therapy, and timely and accurate patient-specific pathogen isolation and susceptibility data gave directed antimicrobial therapy (Can and Karatuna, 2018).

Therefore a hospital based study on laboratory services would hand over the baseline information to policy makers at different management levels to help an effective and efficient laboratory system including a safe workplace, full facilities of equipment and reagents, proper and safe laboratory waste management, proper record keeping system and skillful health manpower for quick reporting of test results, implementing the antibiotic policy and standard treatment guidelines and developing the infection control committees (Tsegaye et al., 2014).

In addition, the findings of this study can be used to determine the needs of the laboratories and may contribute to next steps for strengthening policy, human resource development, logistic management systems, forecasting and procurement methodologies, effective hospital infection control and antibiotics stewardship program in providing laboratory services in hospital to a certain extent.

Moreover, there are still limited studies on utilization and challenges of laboratory services in Myanmar. Hence, this study can fill this research gap as a baseline study.

CHAPTER (2)

LITERATURE REVIEW

Clinical laboratories play a critical part in health care. Conventionally, clinical laboratories consist of the following sections: blood banking, biochemistry, hematology, and microbiology. In a university or academic setting, these laboratories are usually under the department of clinical pathology, with the supervision of a board-certified pathologist or microbiologist. Many independent commercial laboratories are now available to provide timely and reliable services to clinicians and hospitals when such services are not locally available. With the advent of molecular and genomic medicine, newer divisions and subspecialties have been brought about to the area of clinical pathology (Camps, 2014).

Laboratory services are the corner stone of healthcare programs as 70% of the clinical decision making are directly impressed by laboratory test results. In a period of potential and infectious disease epidemics or pandemics, laboratory facilities of poor quality or limited capacity may lead to as ever under-detection of disease cases, allowing epidemics to gain a critical mass and spread (International Organization for standardization, 2012).

2.1 Pathology laboratory

The pathology laboratory is a very big set up in the large hospital especially if, it is associated with a teaching institution. The components of the pathology laboratory services are morphological pathology, clinical pathology, microbiology and hematology. In microbiology laboratory, there are bacteriology, parasitology, mycology, virology and immunology (Procop, 2010).

The function of the laboratory begins when patient specimens are received in the laboratory; the laboratory should process and handle the specimens appropriately and in a timely manner that ensures the quality and safety of the specimen. Depending on the type of specimens and tests requested, the specimens work up accordingly by performing different testing procedures, and accurate and reproducible results will be generated. Clinicians can use the information obtained to make in clinical decisions and initiate treatment options best fitted for that particular patient. To facilitate the process, it is ultimately importance that clear communication exists between the

clinician placing the order and the laboratory professionals performing the tests. This communication is vital because it promotes efficient use of laboratory resources and also improving turnaround time for test results (Procop, 2010).

2.1.1. Location

It is preferable to have the hospital laboratory planned on the ground floor and so located that it is easily accessible to the wards. In smaller hospital, where there are significant outpatient services and the wards. In larger hospital, the increase number of outpatients that crowding the laboratory for giving laboratory samples may block the department. Therefore, in a larger hospital, the entry of outpatients to the laboratory should be opened as a separate sample collection counter in the outpatient service area (Sakharkar, Kangueane and Mathura, 2007).

2.1.2. Staffing

Staff are the most important resource for any laboratory and laboratory head has the responsibility for the effective management of staff. There must be adequate numbers of staff with appropriate qualifications. All staff must be properly trained for the work and provided with the authority and resources to carry out their responsibilities. All staff are adequately supervised (WHO, 2011a).

Both medical professionals, non-medical professionals, technical and non-technical staff include in regional laboratories staff. The staff strength again depends upon the type of the facilities and workload. The requirement of laboratory technicians can be resolved by observation on the basic of generally accepted norm, which can about 30 tests per day per technician. The advanced of automatic and semi-automatic specimen processing machines can work out on the basic of observed time. (Joshi, 2009).

The hospital laboratory service must be under the control and directed by a qualification doctor in pathology or a PG degree in the new discipline of Laboratory Medicine and become the overall in charge of the laboratory responsible person in quality control, standardization and administration. The amount of work in smaller hospitals may not justify full time services of a pathologist. Technicians, phlebotomists and attendants are also needed (Sakharkar, Kangueane and Mathura, 2007).

2.1.3 Reporting procedure

The reporting procedure should establish clearly in reporting by telephone,

reporting via computer network and reporting the critical results. The report form should design with an appropriate format including the name and/or symbol of the laboratory, name or code of the patient, tests requested, specimen receiving date, reporting date, test results, names of persons who reported and approved the results, etc. All reports should be legal documents. The laboratory should maintain a copy of the report for an appropriate period of time (kusum, 2005).

2.1.4 Records

All examinations performed in the laboratory should keep in a daily record register in order to maintain a monthly and yearly account of the work done. Sufficient space is allowed against the name of the patient in the results. The system of preparing two copies of request form and entering examination results on both copies. This becomes the permanent master record for reference at any time in future. The task of this register is now taking over by computer (Sakharkar, Kangueane and Mathura, 2007).

2.1.5. Laboratory waste disposal

Histopathology and microbiology laboratory waste should consider as hazardous waste and should dispose accordingly. In fact, all waste material from all the sections of the laboratory treat as hazardous waste and should dispose by burning in the hospital incinerator (Sakharkar, Kangueane and Mathura, 2007).

2.1.6 Safety

Health laboratories are potentially dangerous places to work in because it has hazarded as chemical, electrical, physical, mechanical, biological or radiation. The risk persons are laboratory staff, customers and visitors entering the laboratory environment; so it is important for all laboratory staff to recognize the potential dangers and reduce risk to a minimum as possible. Disposal of all infectious waste including sharps must be managed safely and effectively according to waste management regulations. The laboratory must be used separate waste disposal systems for infectious and non-infectious waste. Special containers must be used for sharps disposal, solvents and radiological wastes (Tsegaye et al., 2014).

The SOPs must develop to ensure the safe handling of all samples and procedures such as phlebotomy, sample transports, sub-sampling, analytical procedures, storage and disposal of samples. They should be available at all work stations and provided to appropriate staff. A list of diseases of national and

international concern that require emergency action must be available in the laboratory (WHO, 2011a).

2.1.7 Specimen collection, labeling and handling

(a) Laboratory samples

There are two groups of sample to be examined by the laboratory, that are; samples collected by nursing staff in nursing units or OPD and sent to the laboratory, and samples obtained by laboratory personnel from patients at the laboratory. All requests for laboratory examinations must be in writing (Macleay, 2014).

(b) Sample receiving

In the reception area, all samples of blood, feces, urine, pus, body fluids, swabs, etc. should be received at the reception window counter. Sufficient ranks/shelves and a hand washing facility must be available in the area under no circumstances, samples should be collected from any patient in any room used as laboratory work area. Specimen collection for fine needle aspiration cytology (FNAC) requires a separate cubicle in the patient reception area or in the pathologist's office laboratory (Macleay, 2014).

(c) Request forms

All request forms should be uniform in size and contain only relevant information. A laboratory request form has two basic components which are the patient's particulars including brief clinical details and the laboratory test results. Unplanned laboratory forms have resulted in a waste of paper and effort. Very few hospitals have standardized forms. Use of structured request forms, with appropriate color coding, standard size and appropriate design leads to time saving all around and a definite aid in quality control (Sakharkar, Kangueane and Mathura, 2007).

(d) Time for accepting quality

Establishment of a time schedule for accepting certain types of specimen would facilitate the operating of the laboratory, although emergency requests are accepted at all times and priority over all other requests. Medical staff and nursing personnel at times develop a tendency to assign such priority when in reality they should have requested the examination much before. Laboratory personnel tend to lose respect for such emergency classifications (WHO, 2011b).

(e) Containers

All specimens sent to the laboratory should be in proper containers. Instructions on the time of taking specimens, minimum volume necessary, type of

container, etc, preservatives, should be reported to the wards together with the list of commonly requested examination and the time schedule for sending specimens to the laboratory (Macleay, 2014).

(f) Identification of the specimens

The laboratory personnel are responsible for the proper deposition of all specimens or request that should be allowed to be left in the laboratory unless a laboratory repetitive is present. In order to proper identify specimens received, a numbering system should be constructed whereby the specimen and the request form is given the same number becomes the sole means of identification of the patient's name with the specimen. Therefore, the patient's particulars should be double checked with the specimen label and request form (Sakharkar, Kangueane and Mathura, 2007).

2.2. Training

Training must include an understanding of importance of quality. Training should be a competency based and must be followed by post-training courses to provide a continuous support. The Department of Medical Science has been developed training and refresher courses of both theoretical knowledge and practical skills in order to regularly train and strengthen the capacity of laboratory personnel in the areas of testing and diagnosis of both infectious and non-infectious diseases (Kusum and Silva, 2005).

2.3 International studies

In the US study, overutilization often occurs at the initial patient evaluation, as many health care providers may choose a "shotgun" approach and order several unnecessary tests. Duplicate testing alerts were implemented in the electronic health record to reduce unnecessary testing. Underutilization is a key component of early chronic disease care that can save healthcare costs and prevent the increased utilization of diagnostic laboratory services. Clinical laboratory testing plays an important part in identifying chronic conditions and helping clinicians devise the most appropriate treatment plans (Baird et al., 2018).

The appropriately ordered tests must do efficiently and correctly to get the best laboratory outcome that mean meeting the clinical need with accurate, satisfactory, cost-effective services, and the test results must interpret and report effectively (Free, Leary and Brook, 2018).

The laboratory turnaround time becomes one of the main challenges in clinical laboratory which can be solved with established of laboratory management software with automatic result updating feature (Nair, 2018). In the Western New York study stated that health care providers should be facilitated in development of continuing education which has a positive effect on guideline for administrating of blood tests and also making in reduction of unnecessary testing (Suresh, 2017). In the study of academic medical center in New York, overused of diagnostic testing has many effects on both qualities of care and costs to the health care system. It can be reduced by using electronic health record system (Iturrate et al., 2016). In the American Journal of Clinical Pathology, decrease use of laboratory tests which are not medically needed should be applied for controlling of laboratory costs but define an appropriate use of laboratory tests is still more difficult than it might seem (Wilson, 2015).

In the Ethiopia study, the main factors affecting provision of laboratory quality services were shortage of resources (64%), poor management support (57%), poor equipment quality (53%), high workload (41%), lack of equipment calibration (38%) and lack of knowledge (23%) (Mesfin et al., 2017). In other study, proficiency testing (PT) is the most commonly use test for External Quality Assurance (EQA) and a tool for measuring laboratory performance (Ababa, 2017).

The Global analysis in 2017 reported that the top five challenges in their laboratory were instrument maintenance (73%), a complex of testing requirements (63%), time consuming for sample preparation (60%), keeping up with changing regulation (52%), better management of data (50%) and workflow optimization (40%) (Analysis, 2017). The study in California, instrumentation such as equipment maintenance, upgrading, automation and capacity building was one of the challenges in laboratory (Petreas and She, 2003).

The study in Iran, nearly one third of hospital laboratory tests were ordered without medical induction ie, inappropriate and only 1.5 % of laboratory tests were inefficient and produced repeated services (repeated tests) due to laboratory errors. Both inappropriate and inefficient testing waste the time and unnecessary use of resources in health care services delivery (Meidani et al., 2016).

In the Africa study, laboratory service provision is impeded by high personnel turnover and about 56% of laboratory technicians left their posts after 2 years due to other operations 80% and further graduate studies 20% (Zhang et al., 2016). In the

Semcon Innovation Laboratory study revealed that requirement of enough resources was needed for managing innovation laboratory (Bondeson, 2016).

The study in Sudan mentioned that about two third of government hospitals were found as safety laboratory design according to the international standard scales. One fourth of laboratories receives employee education and training for quality of laboratory services (Ali et al., 2015).

The study in Pakistan, the poor resources and lack of healthcare worker's training in infectious waste leading to poor waste management at hospitals (Kumar, 2015). The study in Nigeria revealed that two third of laboratory scientists have received at least one training in the past year (Nguku et al., 2014).

According to the international organization for standardization of medical laboratory, laboratory services are the corner stone of healthcare program as 70% of the clinical decision making are directly impacted by laboratory test results (International Organization for standardization, 2012).

In the guideline on good clinical laboratory practices, a laboratory information system is an important role in managing complex processes, provide regulatory compliance and promote collaborations between multiple laboratories. The laboratory must have a strong policy for employees to communicate concerns regarding testing quality or laboratory safety (Ezzelle et al., 2008). Laboratory information system is essential for the electronic medical record and it is a cornerstone of integrated laboratory services (Henricks, 2000).

The guideline in laboratory supply chain, challenges are frequent stock out of reagents, needs for commodities in customer services, weak or no standard ordering procedures ,rationing of entity in inventory management, not trained staff members in logistics management, limited staff , lack of supervision in management and staffing, lack of guidelines on testing and testing protocols, unclear policies on staffing and staff responsibility and authority in the policy and regulatory environment (Project, 2008).

In Kenya study, facilities like convenience space for staff working and perform their allocation duties make a main contributing factor for the staff well-being. Infrastructures are also appropriate for the services offered and for the proper functioning of equipment (Ojwang, 2001).

2.4 Myanmar studies

In the study at Thingangyun General Hospital, the total number of sanctioned manpower were (30) but appointed were (23) and, of these, two medical technologists were attending medical engineer course and another two laboratory technicians were attending to their respective courses. Therefore, a shortage of technician at the laboratory was one of the challenges in laboratory (Yu-Yu-Wai, 2018).

The study in (19) township hospitals of Yangon Region mentioned that the main problems were shortage of technician at the laboratories due to study leave to sit the distance education exam and most of the technicians did not receive on site or foreign training and almost all of the technicians did not have hospital housings. The availability of hospital housing is an important motivation factor for the employee of the hospital including laboratory technicians (Thant-Thant-Tint, 2017).

The study in Thingangyun General Hospital found that the most performed tests was the biochemical tests (43%) and the second most was microbiological tests (35%) (Thida-Win, 2013).

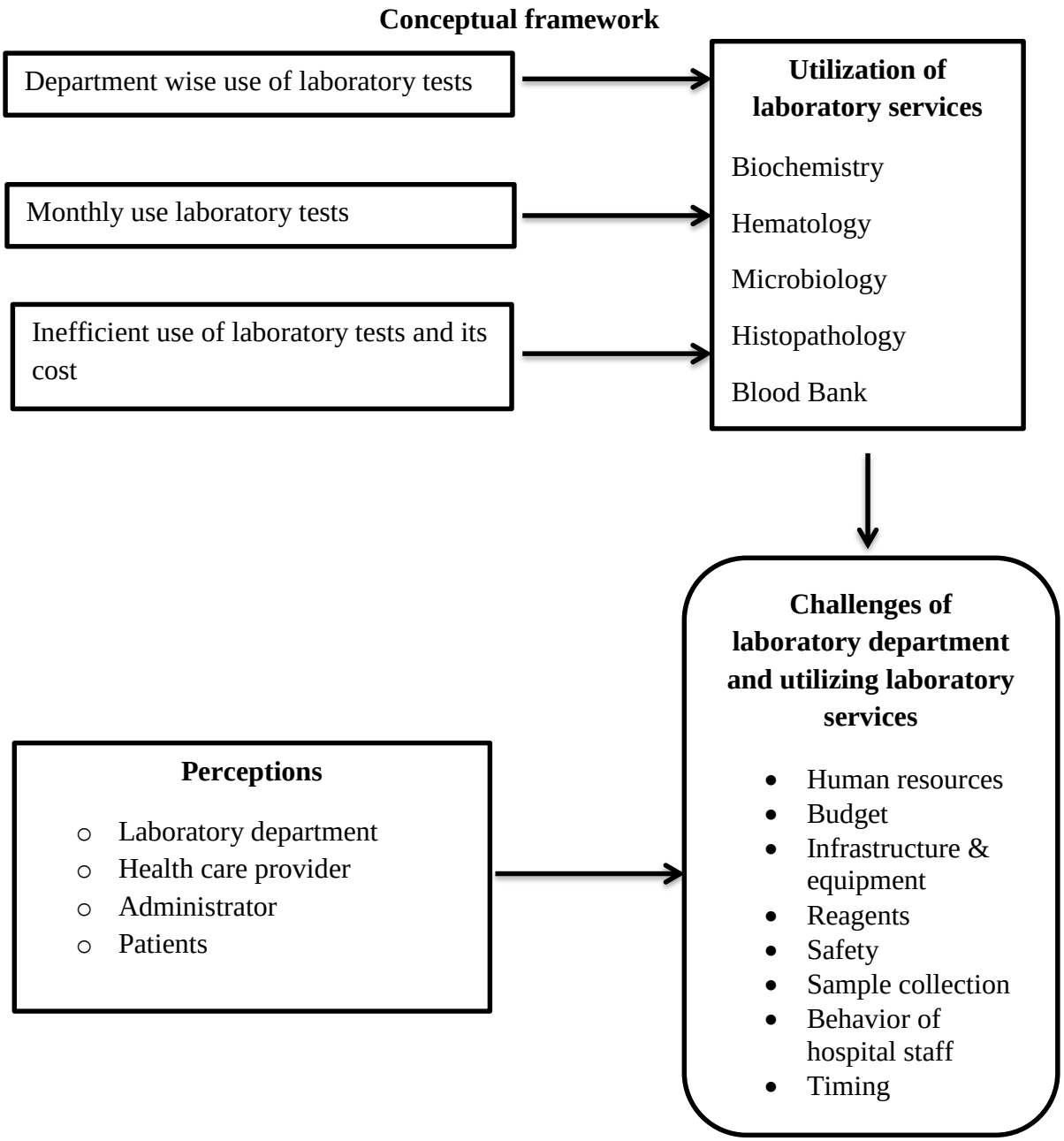

Figure (2.1) Conceptual framework of utilization and challenges of laboratory Services in NOGTH

CHAPTER (3)
OBJECTIVES

3.1 General Objective

To assess the utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital in 2018

3.2 Specific Objectives

1. To describe the organization setup and function of laboratory department
2. To describe the utilization of laboratory services
3. To investigate the proportion of inefficient use of laboratory tests at 24-hour laboratory service section
4. To explore the challenges of laboratory department and utilizing laboratory services

CHAPTER (4)

RESEARCH METHODOLOGY

4.1 Study design

Hospital based cross-sectional descriptive study design with mixed method (both quantitative and qualitative) was conducted.

4.2 Study period

This study was done from August to November 2019.

4.3 Study area

This study was done at the Pathology department, North Okkalapa General and Teaching Hospital.

4.4 Study population

For quantitative study

Records from pathology department of North Okkalapa General and Teaching Hospital (Main laboratory, 24-hour laboratory and blood bank)

For qualitative study

Senior medical superintendent/ DMS, the pathologist, microbiologist and technicians who had at least six months service in pathology department and two health care providers from one medical and one surgical ward of North Okkalapa General and Teaching Hospital

Four patient's attendants whose patients had at least three days of admission to their respective wards of medical, surgical, OG and child in North Okkalapa General and Teaching Hospital during August 2019.

4.5 Sample size determination and sampling procedure

For quantitative study, all data related to laboratory services from Pathology department of North Okkalapa General and Teaching Hospital during 2018.

For qualitative study, a total of 11 respondents (one SMS, one pathologist, one microbiologist, two technicians from Pathology department, two health care providers from one medical and one surgical ward and four patient attendants from medical, surgical, OG, child wards) were involved.

4.6 Data collection methods and tools

For quantitative data, with the objective to describe the utilization of laboratory services and the organization setup and function of laboratory department, secondary data were used by reviewing registers and records (from main laboratory, 24-hour laboratory and blood bank) for year 2018 and 2019 with the permission of Medical Superintendent of North Okkalapa General and Teaching Hospital and Consultant Pathologist of related department. For the objective of investigating the proportion of inefficient use of laboratory tests at 24-hour laboratory service section, inefficient use data was obtained from 24-hour laboratory. In this study, inefficient use was defined as laboratory investigations were requested at 24-hour laboratory but no one collected the laboratory results (either by department or patient).

For qualitative data, key informant interviews (KII) were done to SMS, pathologist, microbiologist, two technicians from Pathology department, two health care providers from one medical and one surgical ward by using interview guideline to explore the challenges of laboratory department and utilizing laboratory services after getting permission from Senior Medical Superintendent. In depth interviews (IDI) were conducted to explore the patients' perception about laboratory services during August 2019. Note taking and tape recording were done with permission. Field notes were written at the end of each interview and all tapes were transcribed. Written informed consents were obtained before the interviews. Interviews were done with interview guideline.

Pre-test for qualitative study was done at Yangon General Hospital. (n=5)

4.7 Data management and Analysis

For quantitative data, the data entry was done by using Microsoft excel 2010. Data analysis was carried out by using SPSS version 16 software. Categorical data were displayed by frequency, percentage, tables and figures.

For qualitative data, recording of the interviews were transcribed into text (transcripts) in exactly the same words (verbatim) as in the interviews. These transcripts included non-verbal expressions of the respondents. Then themes were identified based on the existing theory and literature search. If necessary, themes were identified from the data via through and the repeated reading. A coding system was setup, including themes, subthemes and codes. Coding was done and data analysis was done manually using thematic analysis.

4.8 Ethical consideration

Ethical approval was obtained from the University of Public Health, Institutional Review Board, UPH-IRB (2019/MHA/14). The respondents were explained about the objectives of the study before asking questions and written informed consents were obtained from each respondent. Interviews were conducted in the private places. The name of the patients/ interviewees was not recorded. The records were kept secured without access to other person. Any information provided by participants of this research was kept strictly confidential.

For secondary data collection, the permission was taken from SMS of NOGTH and Professor from Pathology Department.

CHAPTER (5)

FINDINGS

The cross sectional descriptive study using both quantitative and qualitative methods was conducted to study the utilization and challenges of laboratory services in NOGTH. The quantitative study was conducted by reviewing the records and reports of pathology department in 2018 and 2019. The qualitative study was conducted with interview guidelines to explore challenges of laboratory department and utilizing laboratory services.

5.1 Quantitative findings

5.1.1 Organization setup and manpower of laboratory department in NOGTH

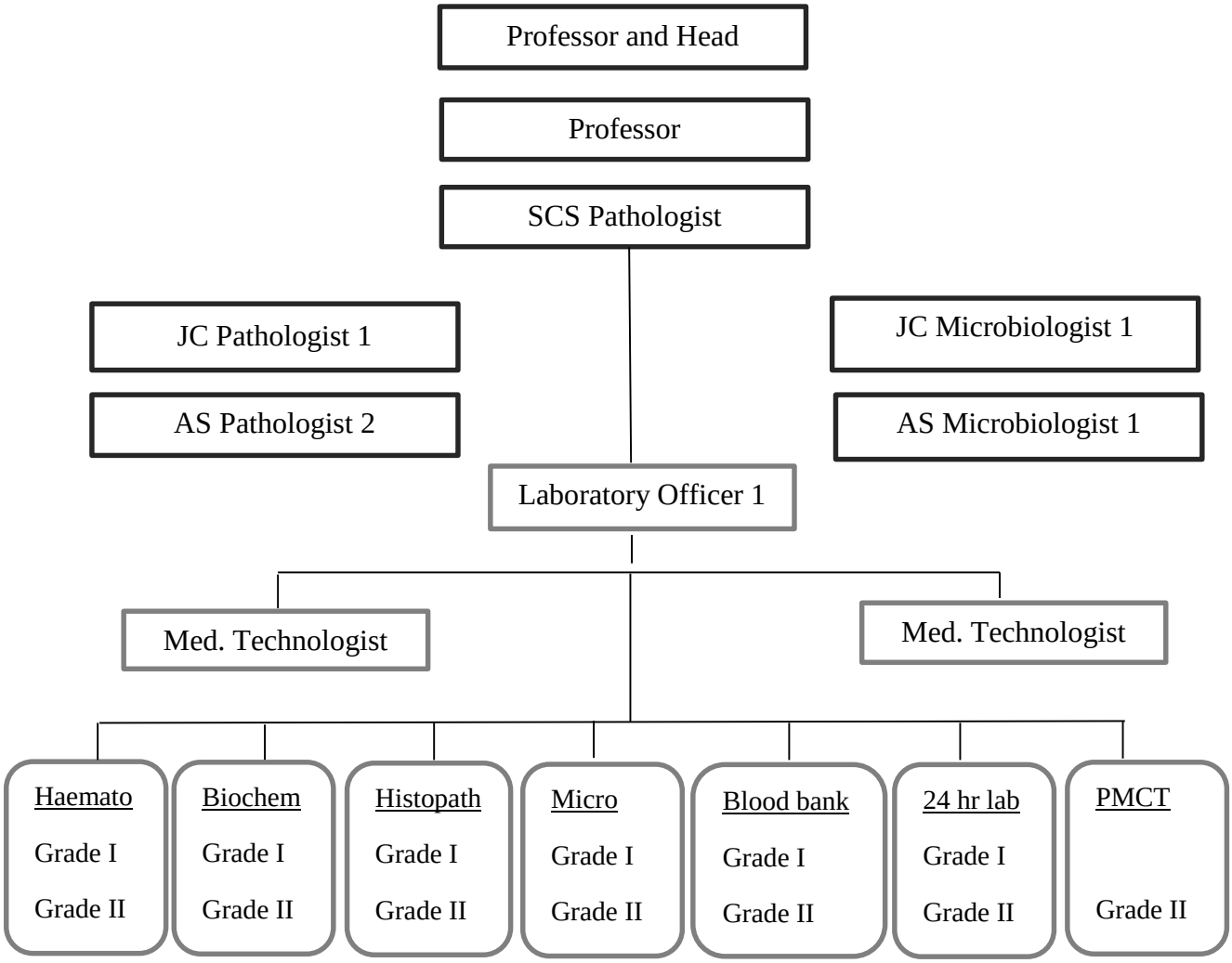

Figure (5.1) Organization setup of laboratory department

Table (5.1) Manpower of pathology department in NOGTH (2019)

S/N	Description	Sanctioned	Appointed	Attached	Vacant	Remark
1	Professor	1	1			
2	Senior consultant Pathologist	1	1			
3	Junior consultant Pathologist	1	1			
4	Junior consultant Microbiologist	1	1			
5	Specialist AS Pathologist	2	2	3		attached 3-under training
6	Specialist AS Microbiologist	1		1	1	attached 1-under training
7	Laboratory officer	1	1			
8	Medical Technologist	10	1	1	9	1-attending training
9	Laboratory Technician (Grade I)	15	10		5	
10	Laboratory Technician (Grade II)	10	8		2	appointed 3-attending training
11	Nurse+ nurse aid		2			
12	Laboratory Attendant	8	1		7	
13	General worker		5			
14	Computer staff		2			
	Total	**51**	**27**	**5**	**24**	

North Okkalapa General Hospital is a (800) bed teaching hospital and clinical laboratory is type 'A" level laboratory. According to current manpower of the hospital, there should be (51) staff in laboratory but there was no specialist AS microbiologist, no medical technologist and only (10) grade I and (8) grade II laboratory technicians. One medical technologist was attached from Thingangyun General Hospital because there was no medical technologist in hospital. Among the appointed technicians, four were attending training to their respective courses. The only one appointed laboratory officer had also taken a pension on September' 2019.

5.1.2 Function of laboratory

In pathology department of NOGTH, there are (8) laboratory services including (5) sections.

(1) Blood bank
(2) Haematology section
(3) Histopathology section
(4) Biochemistry section
(5) Microbiology section
(6) 24-hour laboratory service
(7) PMCT laboratory service
(8) Sample collection

Under the laboratory department, there are (3) parts: **main laboratory**, **24-hour laboratory** and **blood bank**.

(A) Main laboratory

The main laboratory and its sections are not in the same building. It is separated into two parts; the old main laboratory building which is situated in the ground floor of OG ward and the new main laboratory building which is also in ground floor of OG operation theatre near the old main laboratory. The main laboratory performs laboratory tests for both inpatients and OPD patients. It opens between 08:30 and 16:30 from Monday to Friday and there are two places for sample collection at new and old laboratory building. The two sample collection sites receive sample alternately from 9:00am till 1:00pm but sometime it is closed at 12:00 noon depends on the work of laboratory tests. The laboratory tests results are issued in three times as 8:30am, 1:00pm and 4:30pm respectively at PMCT clinic building. Before the process of sample collection and laboratory result collection, the test request form or sample

receive voucher are first lined up and then patients or attendants are waiting for their requests.

There are (33) tests performed as free of charge for in-patients in main laboratory since the beginning of this year and the tests are as follow:

1. Urea
2. Creatinine
3. Electrolyte
4. Liver function test
5. Lipid profile
6. Total protein
7. Albumin
8. Glucose
9. Uric acid
10. CRP (Qualitative)
11. Serum iron
12. Serum amylase
13. Complete blood picture (auto)
14. ESR
15. Retic count
16. Hb%
17. Platelet count
18. BT & CT
19. Blood grouping & Rh
20. Malaria (ICT, Film)
21. HBs Antigen
22. HCV Antibody
23. Retroviral Antibody
24. VDRL
25. Stool RE
26. Urine RE
27. Gram stain
28. ASO
29. RA
30. Widal

31. Sputum AFB

32. ZN stain

33. Gene X pert test

The available tests in main laboratory in each section are as follow:

- Haematology section

-BTCT, CP, ESR, Retic count, G6PD, PT (INR), APTT, Haemoparasite-MP,MF, Bone marrow-aspiration, morphology, HbA1C, Coomb's test, D-dimmer

- Microbiology section

-Urine RE, Stool RE, CSF RE, Sputum AFB, C & S (blood, urine, sputum, throat swab, wound swab, nasal swab, genital swab, skin swab), ASO, RA, Widal, Cryptococcus Antigen, Gene X pert, HBs Ag, HCV Ab, Retroviral Ab, VDRL

- Biochemistry section

-Urea, Creatinine, Electrolyte, Liver function test, Lipid profile, Total & differential protein, Glucose, Uric acid, CRP, Serum iron, LDH, Calcium, Phosphate, Tumor marker-AFP, CEA, CA 125, CA 19-9, CA 153, Thyroid function test-T3, T4, TSH, free T3, free T4, Troponin T

- Histopathology section

Biopsy and Cytology examination

There is also project for PMCT (Prevention of Maternal and Child Transmission) in this hospital which provides the screening tests for pregnant women such as Hb%, Blood grouping, HBs Ag, HCV Ab, Retroviral Ab, VDRL, Urine RE

(B) 24-hour laboratory

The 24-hour laboratory section is situated at the ground floor of the medical superintendent office near the emergency department building.

Previously, 24-hour laboratory section was opened all the time ie. 24 hours for the whole day where emergency laboratory investigations can be done. Recently, it opens at post-office hours, weekends and holidays because of limited technician.

Due to laboratory technician shortage this year, the laboratory operating time for 24-hour laboratory section has been changed to post office hours last two months. On weekdays, 24-hour laboratory opens from 16:00 to 9:00 next morning. On weekends and holidays, it opens for 24 hours.

The available tests in 24-hour laboratory section are CP (auto), urea, creatinine, electrolytes (Na, K, CL, HCO_3), Troponin-I, D-dimer and BCR (HBs Ag, HCV Ab, HIV Ab) tests for emergency operation patients.

In this section, the sample collection and results issuing process are done only at 24-hour laboratory. 24-hour laboratory do the laboratory tests for (3) times a day at weekdays, and (5) times a day at weekend days. The sample collection and results issuing time are as follow:

Day	Sample collection time	Result issue time
From Mon-Friday	4:00pm-9:00pm	11:00pm
	9:00pm-5:00am	07:00am
	5:00am-7:00am	09:00am
From Sat-Sunday	9:00am-12:00noon	01:00pm
(including holidays)	12:00noon-4:00pm	05:00pm
	4:00pm-9:00pm	11:00pm
	9:00pm-5:00am	07:00am
	5:00am-7:00am	09:00am

(C) Blood bank

The blood bank is situated on the ground floor of the medical superintendent office near the 24-hour laboratory. It has two sections, blood collection and blood issue. In the process of blood collection, the blood and blood components is mainly received from the National Blood Center. Only the minority is from the blood donors (voluntary & replacement) and other hospitals. The blood donors are screened for transfusion transmissible infections (HIV Ab, HCV Ab, HBsAg, VDRL) and blood grouping and Rh D typing. All investigation tests for donors and patients are free of charges. In the blood issue section, routine procedures of blood issue are done according to standard operating procedure (SOP) and guideline.

5.1.3 Process flow of laboratory department in NOGTH

I. Main laboratory (office hour)

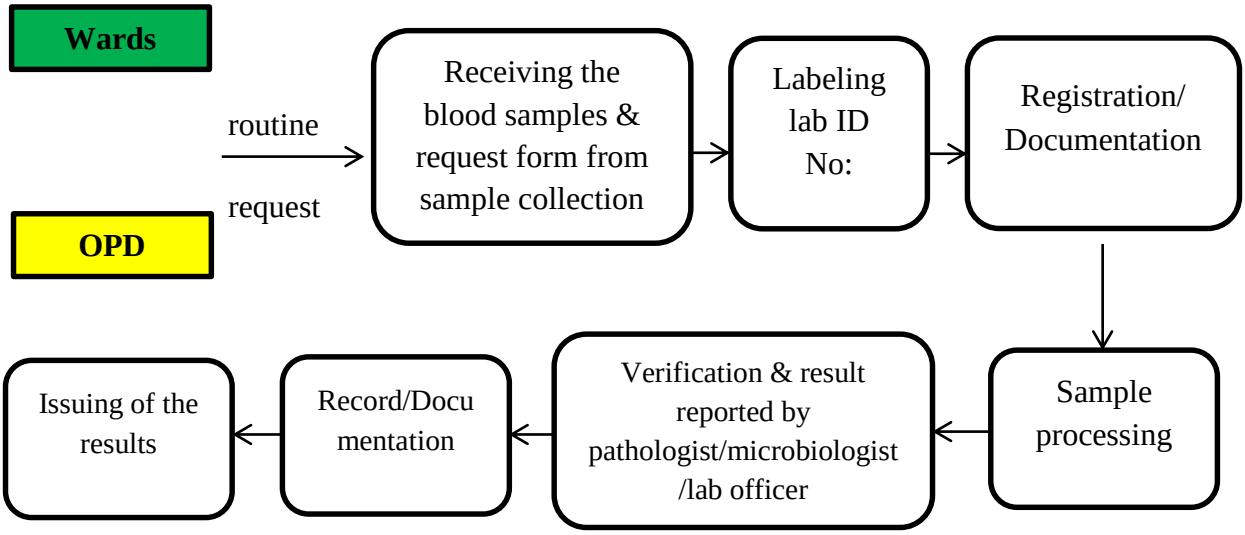

Figure (5.2) Process flow of main laboratory

II. 24-hour laboratory (post-office hour)

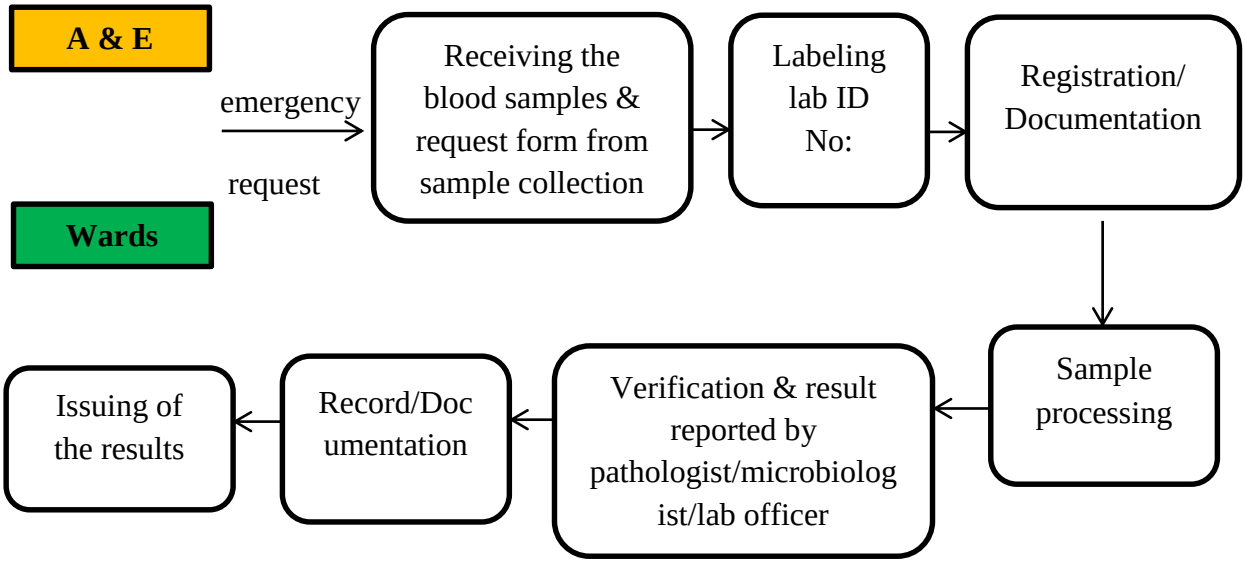

Figure (5.3) Process flow of 24-hour laboratory

III. Blood Bank (Blood Issue section)

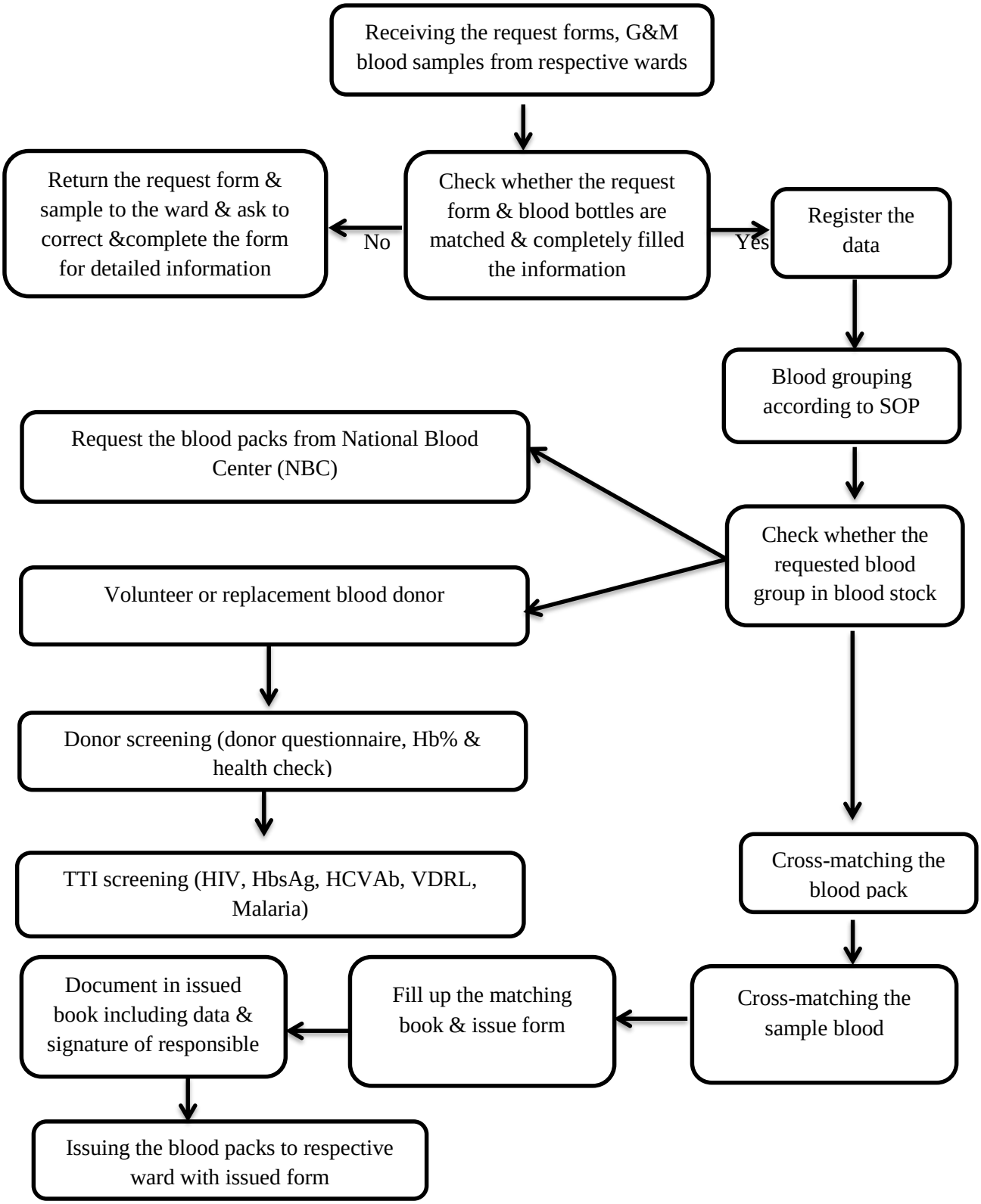

Figure (5.4) Process flow of blood bank

5.1.4 Workload of laboratory

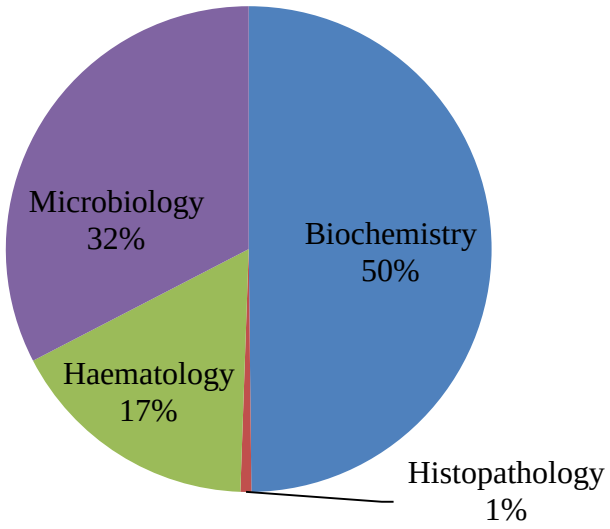

Figure (5.5) General workload of laboratory by each section in 2018 (n=838,359)

In 2018, total tests performed in laboratory (both main and 24-hour laboratories) were (838,359), which was about (69,863) tests per month and average (2,297) tests per day. Among all sections of laboratory (biochemistry, histopathology, haematology and microbiology), half of tests performed was biochemistry tests 417,710 (50%) and second most was microbiology tests 273,296 (32%).

Table (5.2) Laboratory section-wise average monthly workload in 2018 (n=838,359)

Laboratory section	Mean	SD	95% CI
Biochemistry	34,809	4,237	(32,117 - 37,501)
Microbiology	22,775	1,407	(21,881 - 23,668)
Haematology	11,773	1,143	(11,048 - 12,499)
Histopathology	506	53	(472 - 539)

During 2018 in each laboratory section, biochemistry section performed average of (34,809) tests per month, (22,775) tests from microbiology, (11,773) tests from haematology and (506) tests from histopathology section in a month.

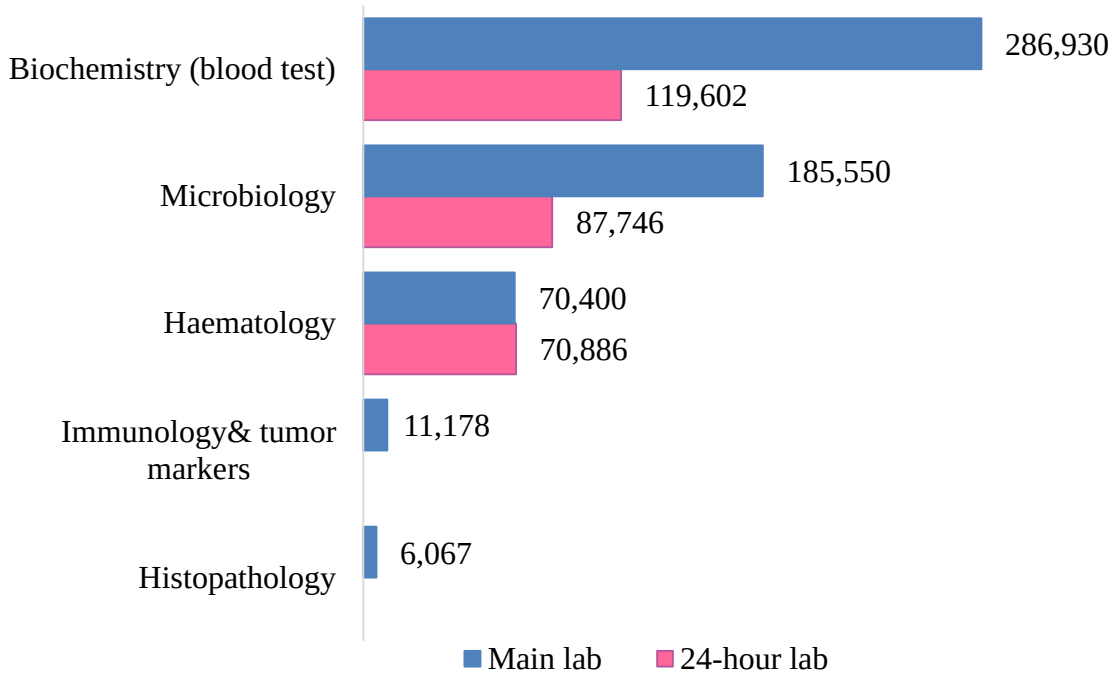

Figure (5.6) Comparison of laboratory tests utilization between main and 24-hour laboratory in 2018 (n=838,359)

In spite of (9) items of laboratory tests were performed in 24-hour laboratory, the main laboratory served (49) items of tests during 2018. The total tests performed were (560,125) at main laboratory and (278,234) at 24-hour laboratory. In 24-hour laboratory, tests of urea, creatinine, electrolyte in biochemistry section, tests of HBs antigen, HCV antibody, HIV antibody, VDRL were examined in microbiology section and tests of CP (Auto), ESR were examined in haematology section. The immunology, tumor marker tests and histopathology tests were not performed in 24-hour laboratory.

Table (5.3) Workload of 24-hour laboratory in 2018 (n=278,234)

Tests	Frequency	Percent
CP (Auto)	65,051	23.4
Electrolyte	44,408	16.0
Creatinine	37,938	13.6
Urea	37,256	13.4
HCV Ab	26,277	9.4
HBs Ag	26,135	9.4
HIV Ab	25,867	9.3
VDRL	9,467	3.4
ESR	5,835	2.1
Total	**278,234**	**100**

Among a total of (278,234) tests performed at 24-hour laboratory in 2018, the most performed tests were CP (Auto) 23%, electrolyte 16% and creatinine 14%.

Table (5.4) Workload of biochemistry (blood tests) section in 2018 (n=406,532)

Tests	Frequency	Percent
Electrolyte	123,279	30.3
Creatinine	114,157	28.1
Urea	107,750	26.5
LFT	21,125	5.2
Glucose	14,143	3.5
Lipid profile	6,345	1.6
Albumin	5,406	1.3
T & DP	5,047	1.2
Uric acid	4,846	1.2
Calcium	2,044	0.5
Phosphate	1,275	0.3
Serum iron	430	0.1
LDH	386	0.1
GGT	160	0.0
Amylase	139	0.0
Total	**406,532**	**100**

In biochemistry section of laboratory, there are 2 sub-sections such as biochemical blood examination section and immunology and tumor marker section. The total tests performed in biochemistry (blood tests) section at both main and 24-hour laboratory was (406,532) and the most common used tests were electrolyte 30%, creatinine 28% and urea 27%. The least frequent used tests were amylase 0.03% and GGT (gamma-glutamyl transferase enzyme) 0.04%.

Table (5.5) Workload of immunology and tumor markers section in 2018 (n=11,178)

Tests	Frequency	Percent
AFP	3,636	32.5
TSH	2,211	19.8
Free T4	1,153	10.3
T4	814	7.3
T3	655	5.9
CEA	635	5.7
Free T3	556	5.0
CA 125	559	5.0
CA 153	483	4.3
CA 19-9	369	3.3
Troponin T	105	0.9
PSA	2	0.0
Total	**11,178**	**100**

In immunology and tumor marker section at main laboratory, the commonly used tests were AFP (alpha fetoprotein) 33% and TSH (thyroid stimulating hormone) 20% in 2018. The least frequent test was PSA (prostatic specific antigen) 0.02%.

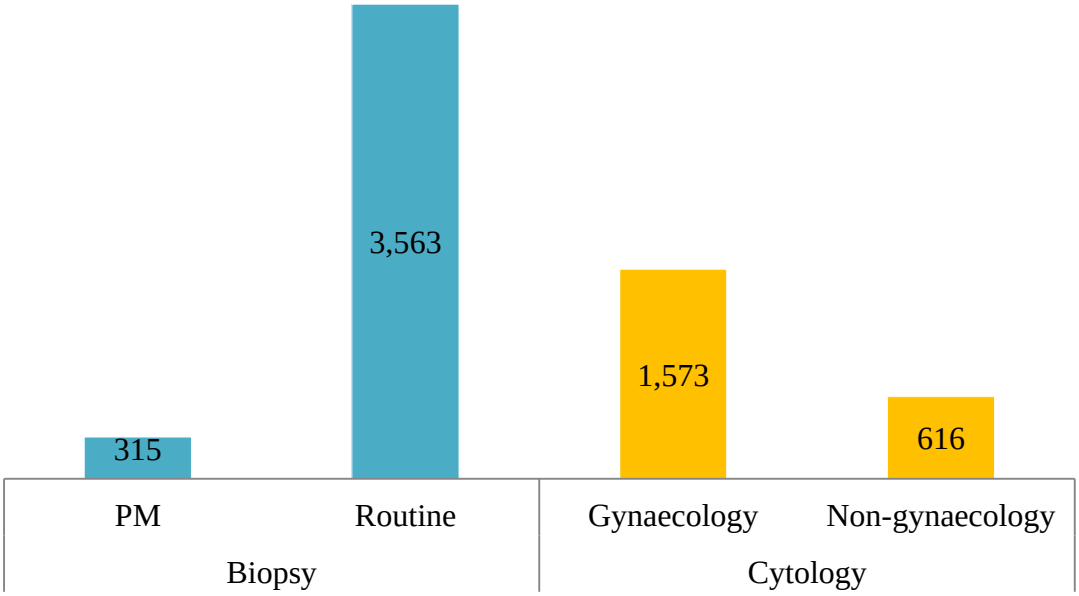

Figure (5.7) Workload of histopathology section in 2018 (n=6067)

In histopathology section, biopsy (routine biopsy and post mortem) and cytology (gynecological related and non-gynecological related) examination were done. In 2018, a total of (6,067) histopathology examinations was performed. Among these, biopsy was (3,878) and cytology was (2,189).

Table (5.6) Workload of haematology section in 2018 (n=141,286)

Tests	Frequency	Percent
CP	116,065	82.2
ESR	13,653	9.7
PT/INR	6,386	4.5
HbA1C	3,080	2.2
BT CT	824	0.6
APTT	645	0.5
Retic count	248	0.2
D-dimer	181	0.1
Coomb's test	98	0.1
Bone marrow	76	0.1
G6PD	30	0.0
Total	**141,286**	**100**

Among (141,286) of total tests performed by haematology section at both main and 24-hour laboratory in 2018, the most utilized test was CP 82% and the least utilized test was G6PD 0.02%.

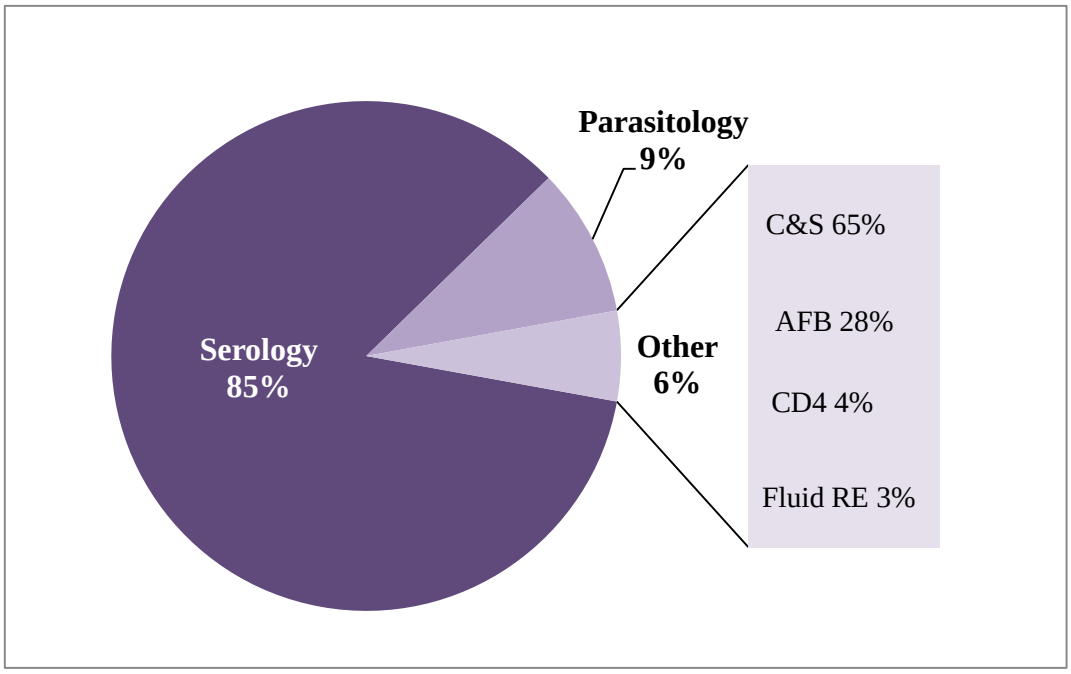

Figure (5.8) Workload of microbiology section in 2018 (n=273,296)

The total tests performed from both main and 24-hour laboratory at microbiology section in 2018 was (273,296) and of these, serology examination was (85%), parasitology was (9%) and other examination such as culture and sensitivities, TB AFB, CD4 count, fluid RE was only (6%). Serology tests include HBsAg, HCV Ab, HIV Ab, VDRL, ASO, RA, Widal and other. Parasitology tests include MP, urine and stool examination. In microbiology section, the most performed tests were (25%) each of HIV Ab, HCV Ab, HBsAg.

Table 5.7 Sources of blood received at blood bank in 2018 (n=28,870)

Sources	Frequency	Percent
National Blood Centre	24,328	84.3
Blood donor	3,237	11.2
Other hospitals	1,305	4.5
Total	**28,870**	**100**

In blood bank of NOGTH in 2018, a total of (28,870) units of blood was collected. The majority of blood received from National Blood Center (NBC) 84% and the minority from blood donor (voluntary and replacement) and other (reallocation of blood from other hospitals).

Table (5.8) Department-wise use of blood and blood components in 2018 (n=30,742)

Wards	WB	PC	PRP	FFP	Cryo	Total
Haemato	102	3,303	3,266	1,153	299	7,853
Surgery	2,492	2,493	857	529	-	6,371
Medical	802	2,400	323	468	-	3,993
OG	1,017	1,407	201	152	-	2,777
Cardiac	572	567	473	369	-	1,981
Liver	107	403	33	1,045	-	1,588
Neuro	749	197	197	193	-	1,336
Child/SCBU	241	376	413	13	-	1,043
ERC	688	95	17	14	-	814
Ortho	335	350	29	57	-	771
Renal	96	437	59	22	-	614
Other	277	957	240	127	-	1,601
Total	**7,478**	**12,985**	**6,108**	**4,142**	**299**	**30,742**
(%)	**(24.3)**	**(42.2)**	**(19.9)**	**(13.5)**	**(0.1)**	**(100)**

In 2018, a total of (30,742) units of blood and blood components were utilized by different wards of NOGTH. Of these, surgical ward was most used the whole blood (WB) component and haematology ward was most used the packed cell (PC) and other blood components such as platelet rich plasma (PRP), fresh frozen plasma (FFP) and cryoprecipitate (Cryo). About one fourth of the blood and blood components was utilized by haematology and one fifth of them by surgical ward.

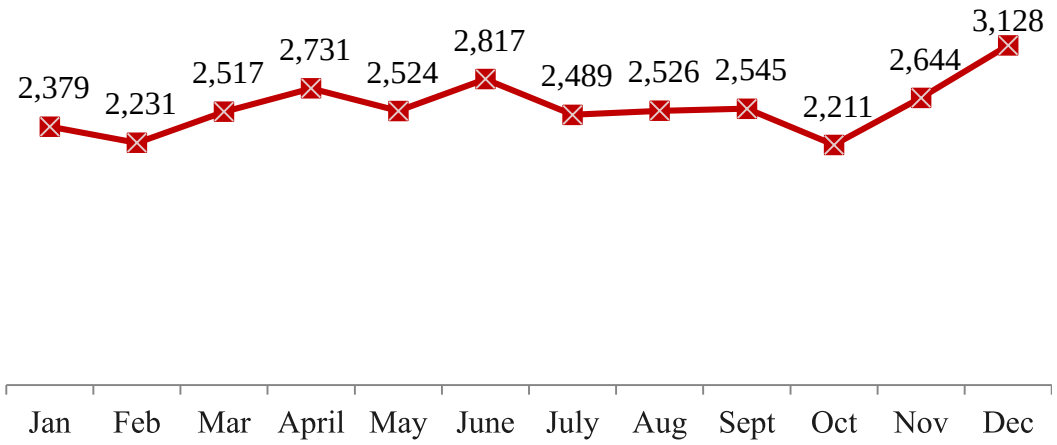

Figure (5.9) Monthly use of blood and blood components in 2018 (n=30,742)

The used of blood and blood components in a month was not so different in 2018. Among (30,742) units of blood and blood components were used by patients from different wards, the month of December, June and April were the most blood used per month as (3,128), (2,817) and (2,731) units of blood respectively.

5.1.5 Inefficient use of laboratory tests

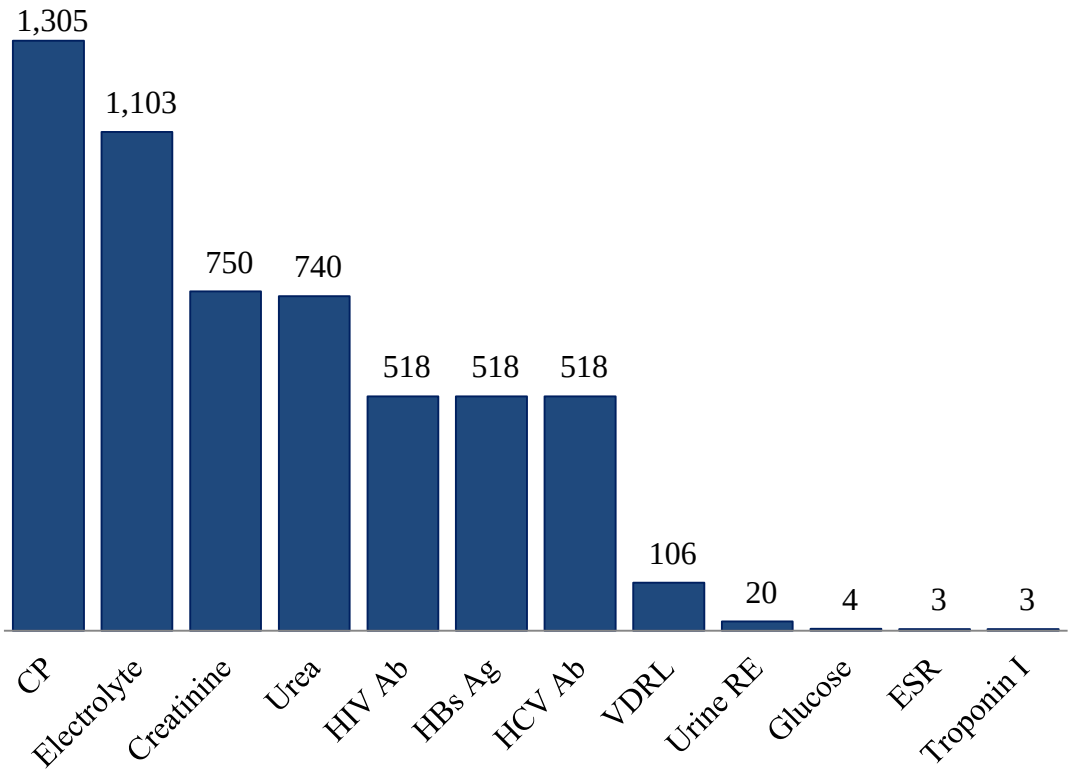

Figure (5.10) Inefficient use of laboratory tests at 24-hour laboratory in January-June, 2019 (n=5,588)

After reviewing the first six months of 2019 24-hour laboratory records, a total of (136,845) tests was done and of these (5,588) number of laboratory test results were found which were left at laboratory because of not return to take the results by the customers. This was defined as inefficient use of laboratory tests. Of (5,588) inefficient use of laboratory tests, CP (auto) (23%) and electrolyte (20%) were ranked top.

Table (5.9) Distribution of inefficient use of laboratory tests by different departments at 24-hour laboratory in January-June'2019 (n=1,526)

Name of department	Frequency	Percent
Accident & Emergency	984	64.5
Medical	151	9.9
OG	127	8.3
Surgical	99	6.5
NSU	46	3.0
Ortho	45	3.0
Child & SCBU	28	1.8
Haematology	21	1.4
Liver	17	1.1
CMU	8	0.5
Total	**1,526**	**100**

After records reviewing of a period from January to June' 2019, a total of (1,526) patients from different wards making the inefficient use of laboratory tests was found at 24-hour laboratory. Of these, most of the inefficient use of laboratory tests at 24-hour laboratory was from emergency department (65%).

Table (5.10) Proportion of inefficient use of laboratory tests at 24-hour laboratory in January-June'2019 (n=136,845)

S/N	Name of laboratory tests	No. of inefficient use test	No. of request test	Proportion of inefficient use of laboratory test
1	Troponin I	3	24	12.5
2	Electrolyte	1,103	22,418	4.9
3	CP	1,305	30,622	4.3
4	Urea	740	17,957	4.1
5	Creatinine	750	18,477	4.1
6	HCV Ab	518	13,297	3.9
7	HBs Ag	518	13,357	3.9
8	HIV Ab	518	13,433	3.9
9	VDRL	106	4,144	2.6
10	Urine RE	20	1,143	1.8
11	Glucose	4	544	0.7
12	ESR	3	1,429	0.2
	Total	**5,588**	**136,845**	**4.1**

Total tests performed at 24-hour laboratory during first six months of 2019 was (136,845) and among these, (5,588) number of tests were found as inefficient during first six months of 2019. The proportion of inefficient use of laboratory tests was about (4.1%).

Table (5.11) Total cost for inefficient use of laboratory tests at 24-hour laboratory in January-June'2019 (n=5,588)

S/N	Name of laboratory tests	No. of inefficient use test	Prescribed cost (MMK)	Total cost (MMK)
1	CP	1,305	4,000	5,220,000
2	Electrolyte	1,103	3,000	3,309,000
3	Creatinine	750	400	300,000
4	Urea	740	500	370,000
5	HIV Ab	518	2,000	1,036,000
6	HBs Ag	518	500	259,000
7	HCV Ab	518	2,000	1,036,000
8	VDRL	106	500	53,000
9	Urine RE	20	500	10,000
10	Glucose	4	300	1,200
11	ESR	3	400	1,200
12	Troponin I	3	15,000	45,000
	Total	**5,588**		**11,640,400**

The price for each test is from NOGTH prescribed price lists which cannot be same as other hospitals. (5,588) number of inefficient use of tests at 24-hours laboratory, the total cost for these inefficient use tests was about 11,640,400 kyats.

Due to time limitation of the study and the condition of the main laboratory after flooding in July 2019, the data and record review of inefficient use laboratory tests can be done only from 24-hour laboratory 2019 data.

5.2. Qualitative findings

For qualitative parts, there were four aspects on challenges of pathology department and utilizing laboratory services. Key informant interviews were conducted to seven healthcare providers from four laboratory staff, one medical superintendent and two healthcare providers of clinical wards with interview guidelines to explore challenges on laboratory department and its services. In depth interviews were also performed among four patients' attendants to explore the perception and challenges on utilizing laboratory services.

5.2.1 Key informant interviews

Table (5.12) Background characteristics of respondents in KII (n=7)

Age (year)	Sex	Designation	Total services	Services at recent hospital
58	Male	Administrator	28 years	3 years 6 months
56	Female	Pathologist	27 years	8 months
43	Female	Microbiologist	16 years	7 years
41	Female	Laboratory Technician	13 years	13 years
23	Female	Laboratory Technician	2 years	2 years
36	Female	Physician	10 years	1 year 5 months
30	Male	Surgeon	6 years	8 months

5.2.2 In depth interviews

Table (5.13) Background characteristics of patient's attendants in IDI (n=4)

Age (year)	Sex	Occupation	Education	Address	Patient's diagnosis	Patient's ward
52	Female	Seller	Non-graduate	Insein	Acute Appendicitis	Surgical
58	Male	Engineer	Graduate	Shwe-paukan	Hematemesis with liver & renal d/s	Medical
45	Female	Dependent	Non-graduate	North Okkala	G1P0 with dribbling	Maternity
40	Female	Dependent	Non-graduate	North Dagon	High fever with jaundice	Child

Four main themes were identified from the transcripts of interviews.

1. Challenges of health staff from pathology and laboratory department
2. Perception on laboratory services by health staff from medical and surgical wards
3. Perception on laboratory services by patients' attendants
4. Suggestions to improve the laboratory services

Theme (1): Challenges of health staff from pathology and laboratory department

Subtheme (1): Insufficient human resources

All of the key informant interview respondents (health care administrator, health care providers from medical and surgical wards, staff from the laboratory department) said that the main challenge was the shortage of manpower. Five out of seven respondents answered that there were insufficient human resources in laboratory, especially laboratory technician and there were challenges in duty allocation in limited resources. One respondent mentioned that there was no assistant microbiologist.

“ဓါတ်ခွဲခန်းဝန်ထမ်းအင်အား:အနေနဲ့ အဓိက ကတော့ technician ပိုင်းမလုံလောက်ဘူး။ medical technician ကလုံးဝမရှိဘူး။ Lab ဦးစီးကလည်း နောက်လဆိုရင်ပင်စင်သွားတော့မှာ”

" In laboratory, the main point is not having enough technician. There is no medical technologist at all. The Lab officer will be retiring next month."

(56-year old female pathologist)

“အခုကလူအင်အားမလောက်တော့sectionတိုင်းမှာtechnicianတွေကိုမျှပြီးထားထားတယ်။ blood bank နှင့်၂၄နာရီဓါတ်ခွဲခန်းမှာတစ်ညကို၂ယောက်စီနဲ့(၄)ယောက်ဆင်းရတယ်ဆိုတော့ရှိတဲ့အင်အားနဲ့ မလုံလောက်ဘူး။”

“Currently, there are not enough technicians being allocated fairly in each section. It's not enough for duty allocation because two technicians were assigned for each section in the 24-hour laboratory and blood bank.”

(23-year old female laboratory technician)

“(၃)ယောက်လောက်လုပ်ရမှာကိုတစ်ယောက်တည်းနဲ့runနေရတော့သူမှားနိုင်တယ်။turn-around time မှာထိခိုက်နိုင်တယ်။ quality of service မှာ challenge ရှိတယ်။”

“It can be wrong to run with one person in spite of three or more people that can affect turn- around time. There is challenge in quality of services.”

(56-year old female pathologist)

Subtheme (2): Weakness in training for staff

Five out of seven respondents answered that there was only on job training and sometime local training for them. They mentioned that refresher training courses concerning about the laboratory were needed for the staff once a year.

“လူအင်အားနည်းတော့သေသေချာချာ supervision မလုပ်နိုင်ရင် error လေးတွေရှိတတ်တယ်။တနှစ်တခါဖြစ်ဖြစ် refresher training လေးတွေပေးနိုင်ရင်တော့ ပိုအဆင်ပြေတယ်။ Job satisfaction ပိုရတာပေါ့။”

"If you can't supervise closely with limited staff, there may be error made by them. It is better to provide refresher training once a year to get more job satisfaction."

(43-year old female microbiologist)

Subtheme (3): Not enough housing for staff

Five out of seven health care respondents answered that most of the health care staff did not have the resident quarter and it made difficult for them to attend their work.

"Supportiveပေးသင့်တယ်။ဝန်ထမ်းအိမ်ယာတွေပေးသင့်တယ်…ဆေးခန်းသာမရှိရင်ကျမ အတွက် မပြေလည်နိုင်ဘူး။အပြင်ဆေးခန်းမှာလုပ်နေလို့တော်သေးတယ်။"

"It should be supportive to staff. Should give staff quarter…. Without working at private, I can't be OK. Now I am fine due to the job at private clinic."

(41-year old female laboratory technician)

Subtheme (4): Increasing workload

All of the KII respondents said that there are increasing in workload of laboratory due to raise of demand in laboratory tests by clinicians as well as increase in patient numbers in spite of sanctioned beds. Four out of seven respondents mentioned that there have been working night duties (24-hour duty) for laboratory technicians in a month and having more pressure at their work.

"ကုတင်(၈၀၀)ဆေးရုံကိုလူနာ(၁၀၀၀)ကျော်ရှိတယ်။ ဝန်နဲ့အားမမျှတော့ ဝန်ထမ်းတွေ မနိုင်ဝန်ကို ထမ်းနေကြရတယ်။ "

"There are more than 1,000 patients in the 800 bedded hospital. The staff is burdened with over workload."

(58-year old male administrator)

“အဓိကကဝန်ထမ်းအင်အားမတိုးပေးနိုင်ရင်workloadလျှော့မှရမှာ။workloadဆိုတာအဓိက ၂၄နာရီဂျူတီတွေလည်းပါတယ်။ night duty ကတလကိုရုံးချိန်အပြင်(၉)ရက်ဆင်းရတယ်။ PMCT ကလည်းတပတ်ကို(၂)ရက်ရှိသေးတယ်။”

“Workload should be reduced if the human resource can't be increased proportionately to workload. Workload also means 24-hour duty. The night duty is 9 nights in a month in addition to the office hours. PMCT… two days a week.”

(23-year old female laboratory technician)

Subtheme (5): Difficulty in duty allocation

Five out of seven respondents answered that there was challenge in duty allocation in limited human resources.

“ဝန်ထမ်းတွေက blood bank တို့၊ 24-hour ဓါတ်ခွဲခန်းတို့မှာဆိုမနေချင်ကြဘူး။ဝန်ထမ်းအင်အားနည်းတော့တာဝန်ချရာမှာအခက်အခဲရှိတယ်”

“The staff do not want to work at blood bank and 24-hour laboratory. It is difficult in duty allocation with limited staff.”

(58-year old male administrator)

Subtheme (6): Weakness in spacing and infrastructure of laboratory and management of equipment and reagents

All of the KII respondents said that the hospital laboratory building is not systematic in design structure and has not enough space for all sections and storage. It is not safe for people in case of emergency because there is only one door for both entrance and exit in each main laboratory building. Most of the health care providers mentioned that although electricity and water supply are adequate but there is no back up electricity system in main laboratory and the main laboratory faced up with flooding during heavy raining in this year and also distorted the function and damage of machines, equipment and materials.

“Labမှာအပြင်လူဝင်လို့မရဘူး။အခုဟာကအတားအဆီးမဲ့လိုဖြစ်နေတယ်။နောက်တစ်ခုကLab ဝင်ပေါက် ၁ ပေါက် ထွက်ပေါက် ၁ ပေါက်ရှိရမယ်။လေအဝင်အထွက်ကအစ အကုန်လုံး ဖြည့်ရမယ်။”

“Lab should not be accessed by outside people. Not the lab is opened to all. Next… lab must have one door each for both entrance and exit. Needs to be fulfilled including good ventilation."

(43-year old female microbiologist)

“Laboratoryသည်လုံးဝလျှပ်စစ်မီးပျက်လို့မရတဲ့အထဲမှာပါတယ်။ reagents တွေရဲ့ expire သက်တမ်းတိုသွားနိုင်ပါတယ်။စက်တွေထားတာဆိုတော့ room temperature control လုပ်နိုင်ဖို့လိုတယ်။ air con လုံလုံလောက်လောက်ရှိဖို့လိုတယ်။ ဆေးရုံတရုံရဲ့ Lab မှာဆိုရင်မီးနှင့်ရေသည် အသက်သွေးကြောပါ။”

“The laboratory must have continuous electricity supply. The expiry life of the reagents can be shortened. The machines need adequate room temperature control. They need adequate air conditioners. Electricity and water supply are crucial for hospital laboratory.”

(56-year old female pathologist)

"warehouse လုံလုံလောက်လောက်မရှိဘူး။ဌာနမှာ store လုပ်ဖို့ရာအခက်အခဲရှိနိုင်တယ်။ ဒါကို monitor လုပ်ရမယ်။ need တွေ consumption တွေ ကို အမြဲတမ်း monitor လုပ်နေရမည်။"

"Not enough warehouse. It may be difficult to store at the department. You have to monitor this. You need to constantly monitor your needs and consumption."

(58-year old male administrator)

“စက်ပစ္စည်းအနေနဲ့အခက်အခဲကတော့ maintenance ပါပဲ။ဒီနောက်ပိုင်းစက်တွေကCMSD ကရထားတယ်။အရင်ကစက်တွေကဘယ်ကဝယ်ထားမှန်းမသိဘူး။ ဘယ် company မှန်းမသိတော့ ပြင်ခိုင်းလို့မရဘူး… တချို့စက်တွေဆို အရမ်းဟောင်းနေပြီ။ companyမသိတော့ maintenance အတွက် အခက်အခဲရှိ။”

"The difficulty with the machine is maintenance. Later, the machines were obtained from CMSD but previous machines were from unknown sources. It is not possible to make any repair as we don't know the sources. Some machines are too

old. There is a problem with maintenance because we don't know these machines from which companies…"

(43-year old female microbiologist)

Subtheme (7): Weakness in supervision and monitoring on safety and infection control measures

All of the health care providers said that management of waste disposal are done according to WHO guideline and hospital standard operative procedure (SOP) but there is still present in challenges of the whole laboratory safety in infectious wastes disposal.

"ဓါတ်ခွဲခန်းသုံးပစ္စည်းတွေက hazard ရှိနိုင်တာတွေကိုင်တွယ်နေရလို့ chemical တွေကို precautionနဲ့သေသေချာချာယူတတ်ဖို့လို education, training တွေပေးနိုင်ဖို့လိုတယ်။PPE ဝတ်ဖို့ encourage လုပ်ပေးရမည်။ close monitoring, supervision and encourage လုပ်ပေးဖို့လိုတယ်။ wasteတွေdrainage လုပ်ဖို့ဆိုရင် closed type ဖြစ်ဖို့လိုတယ်။"

"Needs to provide education and training as they are exposed to hazardous materials and to make precaution in handling with contamination. Encourage to wear PPE. We need close monitoring, supervision and encouragement. For waste to be drained, it needs to be a closed type. "

(56-year old female pathologist)

"Infection control နှင့်ပတ်သက်ပြီးဘယ်လိုမှအပြောနဲ့တင်လုပ်လို့မရပါဘူးတကယ့်လက်တွေ့မှာဘယ်လိုမှမလုပ်နိုင်တဲ့conditionတွေရှိပါတယ်။ကျွန်မတို့ဆီမှာဆရာမအင်အားမလောက်တော့လူနာစောင့်ထားပေးရတယ်။လူနာစောင့်ကလည်းစည်းကမ်းမရှိကြတော့ဘယ်လိုမှထိန်းလို့မရတာတွေပါ"

"Infection control can never be put into words. In reality, there are conditions that cannot be done. We have no enough nurse and staff, so we let patient's attendants who are not disciplined."

(43-year old female microbiologist)

Subtheme (8): Poor interpersonal communication

Two of the health staff answered that they were not happy for working and interpersonal communication among staff became not good due to burden of work in recent year.

“ဒီဆေးရုံကဓါတ်ခွဲဝန်ထမ်းအင်အားနှင့်လှိုင်သာယာဆေးရုံကုတင် ၂၀၀လူအင်အားနဲ့အတူတူ လောက်ရှိတယ်လို့ပြောကြတာပဲ။workloadလည်းဒီလောက်မများဘူး။အခုကတယောက်နှင့်တယောက်ပင်ပန်းနေကြတော့ဖော်ဖော်ရွေရွေမဖြစ်တော့ဘူးပေါ့။”

" Manpower of the lab in this hospital are nearly the same with 200 bedded Hlaing Tharyar Hospital. In the past, the workload was not so much like this situation. Because of increasing workload and tiredness, the staff became short temper and not very friendly with each other.”

(23-year old female laboratory technician)

Theme (2): Perception on laboratory services by health staff from medical and surgical wards

Subtheme (1): Limitation in availability and accessibility of laboratory services

Two health staff from medical and surgical wards mentioned that nearly all investigations can be available and accessible at office hours apart from prolong waiting time. However, sometime it was not convenient for clinicians in patients care because of limited laboratory tests in emergency condition at 24-hour laboratory during holidays and post office hours. Two of the health staff mentioned that there was communication gap between laboratory and clinical wards about information of patients.

“Admission day က ပိတ်ရက်ဖြစ်တဲ့ နေ့ဆိုရင် ၂၄နာရီဓါတ်ခွဲခန်းမှာ basic test လေးတွေရတော့အများအားဖြင့်တော့အဆင်ပြေတယ်။တချို့testတွေတော့emergencyမရဘူး။ limitationရှိတယ်urgentလိုရင်အပြင်ကိုပို့ခိုင်းရတယ်။ လူနာရဲ့ condition ပေါ်လည်းမူတည်တယ်။”

"When admission day is a public holiday, some basic tests are available at 24-hour laboratory. Some tests are not available on an emergency basis…. there is

limitation. If urgent, needs to send outside. It also depends on the patient's condition.”

(30-year old male surgeon)

“necessary test တွေတောင်စစ်တဲ့အခါအခက်အခဲတချို့ရှိတယ်။တချို့ test ကို hourly, 4hourly ဖောက်ရတဲ့အခါ၂၄နာရီခါတိ်ခွဲခန်းမှာတောင်မှ urgent ဆိုပေမဲ့အမြန်မရဘူး။ test လည်း limitation ရှိတယ် သူတို့မှာလည်း workload အရမ်းများ တော့အခက်အခဲရှိမှာပေါ့။”

"Even with necessary tests, there are some difficulties when it comes to testing. Some tests need to be done hourly, four hourly. Some are urgent but not available fast even in 24-hour laboratory. There are limited. They faced over workload and so……challenges."

(36-year old female physician)

“အရင်တုန်းကဆို ward ထဲကအဖြေကိုစုပြီးတယောက်ကလာယူပေးတာမျိုး၊ သူတို့ဘက်က ပြန်လုပ်ပေးတာမျိုးဆိုရင်ကျမတို့ဘက်ကအဆင်ပြေတယ်။ဒါပေမဲ့ ward ထဲမှာလည်းလူအင်အားက မလုံလောက်တော့သူတို့ဘက်မှာလည်းအခက်အခဲရှိနိုင်တာပဲ။”

"In the past, someone collected all the test results for ward. If they did like this, it would be OK for our side. In the ward, they did not have enough manpower …. they also faced difficulties.”

(43-year old female microbiologist)

“Lab LIS system ကလည်းပြည့်ပြည့်ဝဝမဖြစ်သေးဘူး။ လူနာတွေ သွေးပို့ရတာ၊ လူနာကို သွေးအဖြေပေးရတဲ့နေရာမှာ အခက်အခဲရှိတယ်။ stream line အနေနဲ့လုပ်နိုင်ရင်testတွေ auto run နိုင်လာရင်အဆင်ပြေလာ နိုင်တယ်။”

“The Lab LIS system is not fully developed yet. It is difficult to send blood samples and give test results. If you can do it as a stream line or the tests are auto-run, it will be OK "

(58-year old male administrator)

Subtheme (2): Limitation in utilizing laboratory services

Two health care providers answered that laboratory tests were necessary for patient's management and treatment and sometime they have to make repeated tests depending on patient's condition but there was limitation in availability of investigations and prolong waiting time at 24-hour laboratory in case of emergency.

"တချို့ ရောဂါတွေက clinical test ကိုကြည့်ပြီး treatment လုပ်ရတယ်။ patient outcomeကိုကြည့်ရတာဆိုတော……တချို့testတွေကထပ်ခါထပ်ခါစစ်ရတာတွေရှိနိုင်တယ်။ emergency မှာ ဖောက်လို့ရတဲ့ test တွေကနည်းနည်းလေးပဲရှိတယ်။"

"Some illness patients require laboratory tests for clinical treatment and treatment. As a result of the patient's results, some tests may be repeated over and over again. There is limitation in availability of investigations at 24-hour laboratory in hospital."

(36-year old female physician)

"ခွဲခန်းလူနာကသွေးလိုလာပြီဆိုရင်ချက်ချင်းရနိုင်မှအဆင်ပြေနိုင်မယ်။အခုကတနာရီလောက်စောင့်ရမယ်ဆိုရင်ဘယ်လိုမှအဆင်မပြေနိုင်ဘူးreserveလည်းလက်ခံဘူး……သွေးကတော့အပြင်မှာ လည်းမရဘူးလေ။ ပိုက်ဆံနဲ့ လည်း ဝယ်လို့မရဘူးလေ။"

"When an operated patient needs blood urgently, it will be OK if the blood is available in time. Blood bank did not accept reserve blood and in the current situation, we have to wait for an hour for blood. Blood can't be bought at outside."

(30-year old male surgeon)

Subtheme (3): Inefficient use of laboratory tests

All of the health staff answered that there were test results which were not followed by patients/ patient attendants due to a number of reasons such as doing laboratory tests as FOC or may be the patient expired or transferred out or treated as OPD patient or improved condition of patient or prolong waiting time for the laboratory results.

“ဓါတ်ခွဲစမ်းသပ်စစ်ဆေးပြီးသောအဖြေလွှာများပြန်လာမယူတာတွေရှိတယ်။အကြောင်းရင်း ကတော့ test တွေကို FOC ပေးလို့ဖြစ်တယ် Patient transfer/expire ဖြစ်သွားလို့၊ emergency မှာလာပြီးunder observationနှင့်သက်သာသွားလို့အဖြေပြန်လာမယူတော့တာလည်း ဖြစ်နိုင်တယ်။”

"Test reports were not collected… the reason may be getting lab tests with FOC …or it may be…the patient expired or transferred out or may be treated as OPD patient and improved condition.”

(56-year old female pathologist)

“laboratory ကလည်း လူအင်အားနည်းတော့ကြာတယ်။ wards ထဲကလည်းအဖြေကို ချက်ချင်းသိချင်ကြတယ်။ချက်ချင်းမသိရတော့လာမရွေးဖြစ်တော့တာတို့ရှိနိုင်တယ် clinicians တွေ ဘက်ကလည်းတချို့unnecessaryလုပ်တာရှိနိုင်တယ်။တကယ့်လိုအပ်ချက်ကိုသာဖောက်ပို့နိုင်ရင် တော့နှစ်ဖက်စလုံး အတွက်အဆင်ပြေနိုင်တယ်။”

"Because of shortage of manpower and getting of blood results may take time, then the clinicians from wards want to know the results immediately. This fact may be the reason for not collecting the results from the laboratory. It will be OK for both sides if the clinicians only do the needed investigations to the patient."

(58-year old male administrator)

Theme (3): Perception on laboratory services by patients' attendants

Subtheme (1): Prolong waiting time

All of the in-depth interview respondents said that laboratory services were convenient for their patients except a long waiting time in the process of sample collection and result issuing. They mentioned that all requested blood tests were brought to laboratories by patient attendants themselves. One of the respondents answered that they got blood within hours from blood issue section which was convenience for patient's treatment and management.

“အပြင်ဓါတ်ခွဲခန်းကိုပို့တာတော့သိပ်မစောင့်ရဘူးပိုက်ဆံတော့ကုန်တယ်။ဆေးရုံဓါတ်ခွဲခန်း ကိုပို့တာတော့ကြာတယ်။သွေးစစ်တာတော့အဆင်ပြေပါတယ်အကြာကြီး စောင့်ရတာတခုပါပဲ။”

“Don't need to wait very long for outside lab but it is expensive. For hospital lab, it takes times… testing is OK…. the thing is waiting long."

(45-year old, mother of G1P0 dribbling patient)

Subtheme (2): Limitation in operating time of laboratory

Most of the in-depth interview respondents said that there was a gap between operating time of main and 24-hour laboratories which made difficulty for emergency patients. They all said that some laboratory tests were examined at private laboratory by charges in case of emergency situation because not all laboratory tests can be available at 24-hour laboratory in hospital.

"၂၄နာရီဓါတ်ခွဲခန်းက၂၄နာရီဖွင့်ပေးနိုင်ရင်ပိုပြီးအဆင်ပြေမယ်ထင်တယ်။အပြင်မှာစစ်ရတဲ့ဓါတ်ခွဲစစ်ဆေးမှုတွေကိုဆေးရုံမှာစစ်ပေးနိုင်ရင်ပိုကောင်းတာပေါ့။ဆေးရုံဓါတ်ခွဲခန်းကအရေးကြီးတဲ့လူနာတွေကျရင်တော့မြန်ရင်ပိုကောင်းတာပေါ့။ "

" *It would be more convenient for the patient, if 24-hour laboratory is available in 24 hours. If the investigations which can only be tested in outside lab were available in hospital lab with in time results, it will be better for the patient especially in emergency patient.*"

(58-year old, husband of liver disease patient)

Subtheme (3): Poor communication of health staff to the patient’s attendants

Majority of in-depth interview respondents said that communication of laboratory staff was said to be good in spite of very busy of laboratory.

“ကျမကခွဲထားတဲ့အသားစတွေရိသွားမှာစိုးလို့ဓါတ်ခွဲခန်းကိုယူထားလိုက်ပါပြောတာကိုမယူထားပေးဘူး။လူတွေ့ရက်သားနဲ့။၂နာရီမှလက်ခံမယ်ပြောတယ်ကောင်းကောင်းမွန်မွန်လည်းမပြောဘူးစိတ်ဆိုးဆိုးနဲ့ကျမကိုပြန်ပြောလိုက်သေးတယ်။**”**

“I said to the lab to accept the tissue because I’m afraid that the biopsy will be destroyed. But no one would take it. He said he would accept it in 2 hours and he didn't say well. He replied angrily to me.”

(52-year old, mother of acute appendicitis patient)

“ဆက်ဆံရေးလည်းမဆိုးပါဘူးလို့ပဲပြောရမှာပေါ့သူတို့လည်းလူနာအများကြီးဆိုတော့အလုပ်များ တော့တခါတရံတော့အော်တာငေါက်တာတွေရှိတာပေါ့။ခါတ်ခွဲခန်းမှာလည်း ဒီအတိုင်းပဲ ပေါ့။”

"The relationship is not bad in many patients. They are very busy sometimes shouting and also in the lab."

(40-year old, mother of high fever child patient)

Theme (4): Suggestions to improve the laboratory services

All the health care providers suggested that to improve pathology department and laboratory services, there should be provided full sanction of human resources with adequate strength of staff for decreasing workload, given refresher training to the staff, provided safe laboratory building and infrastructures with enough space, height and door, adequate space for equipment and staff, regular maintenance of equipment, made necessary appropriate laboratory tests to reduce burden and improve quality of services and implement functional effective laboratory information system (LIS).

Subtheme (1): To increase manpower and facilities

“ခါတ်ခွဲခန်းမှာလိုအပ်တဲ့ human resource တွေဖြည့်တင်းလိုက်မယ်။ infrastructure တွေလုံလုံလောက်လောက်ဖြည့်တင်းပေးဖို့လိုပါတယ် facilities တွေပေးမယ်ဆိုရင်တော့တိုးတက်လာမှာပေါ့ အဲ့(၂)ခုကတော့ခါတ်ခွဲခန်း တိုးတက်ဖို့အတွက် အရေးကြီးဆုံးပါ။”

"The laboratory needs to be adequately supplied with the human resources and the necessary infrastructure. If it is provided with resources, it will improve. These two points is crucial for the improvement of the laboratory."

(43-year old female microbiologist)

“ခါတ်ခွဲပစ္စည်းတွေကို auto လုပ်နိုင်ရင် stream line နှင့် လုပ်နိုင်ရင် တဖက်တလမ်းက human resources အခက်အခဲကိုဖြေရှင်းနိုင်မယ်မပေးနိုင်ရင်တော့ public private partnership လုပ်ရမည်။ FOC စံနစ်နဲ့လည်း အကုန်လုံးကို အဆင်မပြေနိုင်ဘူး။”

"If you can do auto-test and the stream line, it will solve the human resource problem. The government needs to support this, if not, public private partnership must do. It's not all that well with the FOC system.”

(58-year old male administrator)

Subtheme (2): Giving refresher training

“ဓါတ်ခွဲဝန်ထမ်းတွေ ဝန်ဆောင်မှုတိုးတက်အောင်ဆိုရင် refresher course တွေကို local ရော abroadပါစီစဉ်ပေးသင့်တယ်။သူတို့အတွက်opportunitiesဖန်တီးပေးသင့်တယ်။**”**

"In order to improve the service of the lab staff, refresher courses should be provided both locally and abroad. Opportunities should be created for them.’’

(56-year old female pathologist)

Subtheme (3): Continuous supply of equipment and reagents

“အဓိကကဓါတ်ခွဲခန်းမှာလူအင်အားလုံလုံလောက်လောက်ရှိရမယ်။ပြီးရင်စက်တွေရဲ့ maintenanceကောလိုအပ်တယ်။စက်တွေကိုကိုင်တွယ်မဲ့လူအင်အားလည်းလိုအပ်မယ်။reagentတွေ လည်းတတ်နိုင်သမျှမပြတ်ဖို့လိုတယ်။ဒါမှလည်းrun ဖို့ရာအဆင်ပြေနိုင်မယ်။”

"The main thing is to have enough manpower and then have the maintenance of the machines in the lab, and the reagents need to be a continuously so that services can run smoothly."

(36-year old female physician)

Subtheme (4): To test only the necessary investigations

“wardတွေ၊OPDတွေကလည်းတကယ်လိုအပ်တဲ့testတွေကိုသာဦးစားပေးစစ်သင့်တယ်။ဒါမှ workload နဲ့ဝန်ထမ်းတွေမှာ pressure ကျလာမယ် lab ရဲ့ quality လည်းတိုးတက်လာနိုင်တယ်။**”**

"Wards and OPDs should prioritize the tests that are needed so that the workload and pressure of staff will be decreased, and the quality of the lab can be improved."

(56-year old female pathologist)

Subtheme (5): Establishment of LIS system

“လူနာနဲ့ပတ်သက်ပြီး clinical information တွေကျမတို့ဆီမှာဘယ်တော့မှအစုံအလင် မရဘူးတချို့သော diagnosi sပေးရတဲ့အပိုင်းမှာဆိုclinical information တွေလိုတယ်။အဲဒီအခါ LIS system သာရှိရင်ပြန်ကြည့်လို့ရတယ်။**”**

"We have never received fully clinical information about the patient. To give diagnosis, some needs clinical information. If LIS is available, we can check via LIS."

(43-year old female microbiologist)

Subtheme (6): Maintain inter-departmental coordination

"နောက်တခုwardနဲ့communicationပိုကောင်းလာမယ်ဆိုရင်Laboratoryresultတွေကိုward တွေကလည်းကောင်းကောင်းမွန်မွန်သုံးနိုင်မယ်။ inter-departmental coordination, cooperation ကို apply လုပ်သင့် LISsystemတွေလုပ်မယ်ဆိုရင်ပိုပြီးလုပ်ငန်းအဆင်ပြေတိုးတက်လာနိုင်တယ်။"

"Another point is …. if there is a better communication with the ward, ward can utilize lab results more effectively. Needs to apply inter-departmental coordination…cooperation … If we institutionalize LIS system, the lab process will be improved."

(43-year old female microbiologist)

CHAPTER (6)
DISCUSSION

In this study, hospital based cross sectional descriptive study of utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital was done. It is mainly based on secondary data from laboratory and seven health care providers and four patients' attendants were interviewed with KII and IDI guidelines to explore the challenges of laboratory department and utilizing laboratory services.

6.1 Human resources

In the laboratory department of NOGTH, the total number of sanctioned manpower were (51) but appointed were (27) that was (53%) of sanction. Among these appointed staff, four laboratory technicians were attending their respective training courses. There were no medical technologist and limited laboratory technicians for well-functioning of laboratory. The laboratory encounters problems of shortage of technicians. There was also no specialist assistant surgeon for microbiology. Therefore, a shortage of manpower in laboratory became problem as only half of staff was appointed. There are also no regular refresher training courses to technicians either local or abroad except on job trainings.

Similar finding was found in the study at Thingangyun General Hospital, in which a shortage of technicians was a challenge to laboratory services carried out by only half of appointed staff (Yu-Yu-Wai, 2018).

In the other study on the quality of medical laboratory services in township hospitals in Yangon showed that all respondents did not receive on-site or international training. Majority of respondents (83%) did not receive NHL training and more than half (56%) received one or two trainings at Naypyidaw (Thant-Thant-Tint, 2017).

Other study in East Africa found that five out of nine laboratory technologists left their posts over two years because of insecurity of public-sector salary scales compared to private-sector incentives. That become barriers for sustainability of human resources in laboratory (Zhang et al., 2016).

6.2 Workload of laboratory

During 2018 in NOGTH, about half of tests performed were biochemical tests (50%) and microbiological tests were the second most performed tests (32%). These findings were similar with the study of laboratory services in Thingangyun General Hospital in 2013 and 2018. The biochemical tests were the most performed test (43%, 54%) and the microbiological tests was the second most one (35%, 28%) respectively in 2013 and 2018 (Thida-Win, 2013) (Yu-Yu-Wai, 2018).

In NOGTH, total tests performed at both main and 24 hour laboratories were (838,359) in all laboratory sections during 2018 and biochemistry section performed average of (34,809) tests per month, (22,775) tests from microbiology, (11,773) tests from haematology and (506) tests from histopathology section in a month. Among tests performed in each laboratory section, the commonly performed tests were electrolyte (30%), creatinine (28%), urea (27%) in biochemistry section, AFP (33%), TSH (20%) in immunology and tumor marker section, CP (82%), ESR (10%) in haematology section, (25%) each of HIV Ab, HCV Ab, HBsAg tests in microbiology section and (3878) biopsies and (2189) cytology examinations in histopathology section. In blood bank, the total unit of blood collected was (28,870) during 2018 and the main source of blood was received from National Blood Center (84%). The total amount of blood and blood components used by different wards in 2018 was (30,742) units and average of (80) units of blood were utilized daily. Compared to other wards, hematological and surgical wards were the most utilized consumers of blood as (25%) and (20%) respectively.

NOGTH laboratory is type (A) laboratory, the main laboratory performed (49) items of tests and of these, (33) FOC tests were provided to all inpatients. For patients with emergency condition, (9) items of tests were available as FOC at 24-hour laboratory. A total of (560,125) tests and (278,234) tests were examined by main and 24-hour laboratories respectively in 2018.

6.3 Inefficient use of laboratory tests

Among (136,845) number of total tests performed at 24-hour laboratory section during January to June 2019 in NOGTH, (5,588) number of laboratory test results were found which was not followed or chosen by customers. These inefficient used tests were due to customer's side error. The proportion of this inefficient use of laboratory tests was (4.1%) and total cost for these inefficient tests was about 11 million kyats if the tests were not given as FOC. (65%) of these inefficient use of

laboratory tests at 24-hour laboratory was mainly from emergency department. Due to record keeping limitation of the laboratory after flooding in July of this year, the study can assess only 2019 24-hour laboratory data and a much more proportion of inefficient use laboratory tests can also be found at the main laboratory. Most of the health respondents mentioned that these inefficient use of laboratory tests make waste of the time and unnecessary use of resources and become increased workload for the laboratory. Therefore, reducing redundancy of unnecessary laboratory tests can save time and money for doing necessary tests by the patients and decrease workload of laboratory.

In Iranian study, a total of (9541) laboratory tests among (384) medical records was reviewed for appropriateness and efficiency of laboratory tests used. They found (26.4%) was inappropriate used for clinical care and only (1.5%) was inefficient due to hemolysis, inefficient sampling or absurd results and these inefficiency was mostly due to laboratory errors (Meidani et al., 2016).

As in the study by (Wilson, 2015), it suggested that decreasing utilization of laboratory tests that are not medically needed should be applied for controlling of laboratory costs. But defining appropriate use of laboratory tests is still more difficult than it might seem. Another study stated that health care providers should be facilitated in development of continuing education which has a positive effect on guideline for administering blood tests and also making in reduction of unnecessary testing (Suresh, 2017).

6.4 Challenges of laboratory department and utilizing laboratory services

6.4.1 Challenges of laboratory department

In this study, all of health care providers mentioned about shortage of manpower. Most of them said that only giving on job training for technicians and sometimes they have trained from NHL and NBC. There is sometime challenge in quality of laboratory service with limited technicians and can affect laboratory turn-around time. So, close supervision, regular monitoring and feedback is needed to promote laboratory quality.

Other study in Nigeria revealed that (66%) of laboratory scientists have received at least one training in the past 12 months (Nguku et al., 2014). Another study in Sudan showed that only (24%) of laboratories received employee education and training for quality of laboratory services (Ali et al., 2015). Other study reported that for managing innovation laboratory, enough resources is necessary to have room

for mistakes (Bondeson, 2016). The laboratory turnaround time is one of the main challenges in clinical laboratory which can be solved with establishment of laboratory management software with automatic result updating feature (Nair, 2018).

Other challenges of this study are experience of flooding during heavy raining season at the main laboratory in July 2019 and the laboratory buildings are not a proper laboratory design because of having only one door for both entrance and exit. It has inadequate space and inadequate storage area to keep laboratory equipment, machines and reagents. There are too many types of equipment, advanced machines although amount is enough for laboratory but challenge for maintenance of machines and also an adequate space is needed for laboratory staff and installation of laboratory machine. There is sometimes problem about reagents shortage in accordance with budget but this is negligible. During flooding at the main laboratory, the function of laboratory was delayed for a few week and some basic tests were performed by the 24-hour laboratory at that time.

In other study stated that there are building facilities and utilities services of hospitals were poor for inadequate space (Thant-Thant-Tint, 2017). Other study in California, instrumentation such as equipment maintenance, upgrading, automation and capacity building was one of the challenges in laboratory (Petreas and She, 2003). The study of assessment of (38) government hospitals laboratories in Sudan mentioned that about (78%) were found as safety laboratory design according to the international standard scale (Ali et al., 2015). In the study in Kenya, facilities like convenience space for staff working and perform their allocation duties make a major contributing factor for the staff well-being. Infrastructures are also appropriate for the services offered and for the proper functioning of equipment (Ojwang, 2001).

NOGTH laboratory disposed wastes according to waste management guideline and classified them as domestic wastes and infectious wastes. For personal safety measure, they have enough laboratory coats, face masks, gloves during specimen handling, processing and disposal of waste from the laboratories. The sharp wastes were disposed with sharp bin and the liquid wastes (infectious waste) were disposed to the septic tank. There is no separate infectious waste tank. Laboratory followed waste control guideline and planned the safety measure but activities of disposal of infectious and biochemical wastes are still needed to be improved.

In NOGTH, the laboratory gives antimicrobial resistance reports to wards in six monthly and always reviews antimicrobial data. They follow WHO color coding for waste management and supervise infection control with checklists. Hospital antibiotic guideline, antibiogram and standard treatment guidelines were already prescribed.

A study in Pakistan showed that there are no separate boxes for hazardous wastes. Health workers have to collect and transport wastes three times a day in a simple way with uncovered trolley. Due to the poor resources and lack of healthcare worker's training in infectious waste results in poor waste management at hospitals (Kumar, 2015). Other study said successful implementation and maintenance of health and safety procedures rely on cooperation and collaboration of all laboratory personnel because they are exposed to many infectious agents in handling of laboratory process (Ojwang, 2001).

6.4.2 Perception of health providers on laboratory services

Other challenges of this study are prolonged waiting time for laboratory services at both main and 24-hour laboratories and limited operating time (post-office hour) at 24-hour laboratory because of limited human resources. To solve this challenges, most of health care providers suggested to establish laboratory information system (LIS) as soon as possible which can be used for controlling and managing the samples, reporting test results and automation of all laboratory processes.

Other study showed laboratory information system is essential for the electronic medical record and it is a cornerstone of integrated laboratory services (Henricks, 2000). Laboratory information management system (LIMS) should be used for generating relevant information and providing data for evaluation, planning and quality of health services and to establish standard record keeping systems for recording and reporting process of laboratory (WHO, 2011a).

6.4.3 Perception of patients' attendants on laboratory services

Most of the patients' attendants in this study expressed good perspectives on staff behavior and communication skills. Challenges are long waiting time in sample collection and results issuing process. It may be due to no functioning LIS system in staff shortage and over workload in laboratory.

Similar finding was seen in the Myanmar study done at Thingangyun Hospital. To solve problem of prolong waiting time for the laboratory services in the staff shortage condition, LIS system should be upgraded (Yu-Yu-Wai, 2018).

Study limitation

Because of time limitation of the study and the condition of flooding at the main laboratory in July this year, the data of inefficient use laboratory tests can be reviewed only from 24-hour laboratory for the first six months of 2019. A much more proportion can be found at the main laboratory.

CHAPTER (7)
CONCLUSION

Laboratory services play an important role for a comprehensive health care system. The reliable and timely results from laboratory tests are critical elements for decision making in all aspects of health care and also essential for the surveillance and disease control of public health importance. The accurate laboratory data are needed for clinicians in assessment of patient's health status, making an accurate diagnosis, formulating a treatment plan and continuous monitoring of the treatment effects (WHO, 2011a).

The laboratory department of NOGTH has (3) parts: main laboratory, 24-hour laboratory and blood bank and also consists of almost all possible sections: biochemistry, microbiology, haematology, histopathology and blood issue section. There are (49) items of tests available at main laboratory and of these, (33) tests are given free of charge (FOC) to inpatients. Only (9) items of tests are available and give FOC but now blood culture samples can be received and stored at 24-hour laboratory which is convenience for clinicians in patient' s management and treatment care.

The total tests performed by both main and 24-hour laboratories in 2018 was (838,359) and average of (2,300) tests was done in a day. The average monthly used of laboratory tests by each section was (34,809) tests in biochemistry, (22,775) tests in microbiology, (11,773) tests in haematology and (506) tests in histopathology section. Among tests performed by each laboratory sections, half of the tests performed were taken place by biochemistry and one third by microbiology tests. In blood bank, a total of (28,870) units of blood was collected and majority of blood received from National Blood Center during 2018. From blood issue section, a total of (30,742) units of blood and blood components were utilized by different departments and average of (80) units were given daily. The study on inefficient use of laboratory tests at 24-hour laboratory section for the first six months of 2019, about 4.1% was found as inefficient use laboratory tests among (136,845) of total tests performed at 24-hour laboratory during these period.

The findings from the interview of health care providers revealed that there were many challenges such as insufficient human resources especially in laboratory

technicians, no regular trainings to technicians and not having a proper laboratory design of main laboratory buildings, inadequate space and storage area for laboratory machines, equipment and reagent. There was sometime challenge in quality of laboratory service with shortage of technicians that can affect laboratory turnaround time. Regular close supervision, monitoring and feedback is needed to promote laboratory quality services. There was no problem for reagents in hospital and health staff followed WHO color coding system for waste management. The health care providers suggested to establish functioning Laboratory Information System to reduce waiting time for results and prevent unnecessary missing as inefficient use and brokers. Most patients' attendants were satisfied with communication skill and technical skill of health staff and utilizing laboratory tests but they all mentioned that prolong waiting time at the sample and result collection process as a difficulty.

The finding of this study can be used in supporting on determination of the needs of the laboratories, human resource development, building and infrastructure upgrading, implementation of LIS system, effective infection control and antibiotics stewardship program in hospital and may contribute next steps for strengthening policy.

CHAPTER (8)

RECOMMENDATIONS

According to the study finding, the following recommendations were drawn;

1. Laboratory department should be fully provided with human resources especially laboratory technicians and assistant microbiologist.
2. Intensive refresher trainings and supportive facilities should be given to laboratory technicians.
3. Close supervision, regular monitoring and feedback should be given to the laboratory staff by the senior officials to promote quality of laboratory services and tests turnaround time.
4. Laboratory building should be renovated to a proper laboratory design for prevention from different hazards and provided an adequate space and storage area for installation of laboratory machines, equipment, and reagents.
5. Laboratory information system (LIS) should be institutionalized with an aim to reducing waiting time for results and preventing unnecessary missing.
6. All health care providers should request only the necessary laboratory tests to reduce workload of laboratory with limited human resources.

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ANNEXES

Annex (1) Variables and operational definitions

S/N	Variable	Operational definition	Scales of measurement
1	Age	Age of respondent in completed years	Ratio
2	Education level (in general)	Highest level of education attained by the respondent categorized as 1.Tenth standard passed 2.Attending university 3.Graduate	Ordinal
3	Education level (in laboratory fields)	Educational attainment of respondent categorized as 1.Certificated in Grade II 2.Certificated in Grade I 3.Graduated (B.Med.Tech)	Ordinal
4	Position	The level of laboratory personnel in conducting assays categorized as 1.Laboratory Medical Technologist Grade II 2.Laboratory Medical Technologist Grade I 3.Laboratory Medical Technologist	Ordinal
5	Work experience	Year of working experience in laboratory field	Ratio
6	Training	Training which has been conducted for laboratory staff in the past year	Nominal
7	Motivation	The factor that motivate the laboratory technicians such as: -Housing -Reputation -Security etc.	Nominal
8	Supervision	Supervision of the laboratory performance by 1.Decision of which tests to be performed 2.Decision of further testing if indicated	Nominal

		3.Review of tests before result sent reporting	
9	Building facilities	The facilities of the building of laboratory such as: -Adequate of space -Free standing of part of larger structure -Ventilation -Electricity -Backup power source	Nominal
10	Human resources	The number of laboratory staff in different position according to the organization setup of the hospital: -Allowed -Posted -Vacant	Ratio
11	Laboratory services	Testing of materials , tissues or fluids obtained from a patient or clinical studies to determine the cause and nature of disease	Nominal
12	Utility services	The services utilized in the laboratory such as: -Laboratory test performed -Whether laboratory connected to hospital service or not -Type of communication system etc.	Nominal
13	Test performance	The laboratory tests which have to be done at hospital level. (Type A laboratory)	Nominal
14	Laboratory equipment	The laboratory equipment which has to be present at teaching hospital level. (Type A laboratory)	Nominal
15	Reagent	The reagent that is used in laboratory tests at hospital. (Tests done in Type A laboratory)	Nominal
16	Laboratory management	Management of the laboratory focusing on operation hours and presence of protocol or SOPs etc.	Nominal

17	Specimen collection and handling	The procedure of collection, labelling and handling of specimens based on: -Proportion of sample collected on site -Use of standardized request form -Labelling of sample with the patient's name and unique identifiers -Presence of log book or electronic record -Use of appropriate collection tube for specific test of blood sample -Referral of sample to NHL	Nominal
18	Reporting procedure	The procedure of reporting based on -Presence of records -Presence of standardized report form -Result within turnaround time -Presence of notifiable disease list -Regular report to MOHS	Nominal
19	Laboratory safety	The procedure of safety that are done at laboratory based on -Training in laboratory safety -Accessibility of safety manual -Methods used in waste disposal -Immunization of staff -Availability of protective clothing /equipment	Nominal
20	Inefficient use of laboratory test	Requested laboratory test’s results were not followed or chosen by the customers (patients / health care providers)	Nominal

Annex (2) Informed consent form (Myanmar and English)

သုတေသနနည်းပညာနှင့်ကျင့်ဝတ်ကော်မတီ

ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ် (ရန်ကုန်)

သုတေသနသဘောတူညီချက်ပုံစံ

မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီး ၊ ဓာတ်ခွဲဌာန၏ ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများကို သုတေသနပြုလုပ်ခြင်း

အဓိကသုတေသီအမည် - ဒေါက်တာသီတာအောင်

ဌာန - ဆေးရုံအုပ်ချုပ်မှုပညာမဟာဘွဲ့သင်တန်းသူ ၊
ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ် ၊ ရန်ကုန်။

သုတေသနခေါင်းစဉ် - မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီး ၊ ဓာတ်ခွဲဌာန၏
ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများကို
သုတေသနပြုလုပ်ခြင်း

အပိုင်း(က) သုတေသနနှင့်သက်ဆိုင်သောအချက်များ

၁။ မိတ်ဆက်နိဒါန်း

ကျွန်မသည် ဒေါက်တာသီတာအောင် ၊ ဆေးရုံအုပ်ချုပ်မှုပညာမဟာဘွဲ့သင်တန်းသူ ၊ ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ် ၊ ရန်ကုန်မှ ဖြစ်ပါတယ်။ ကျွန်မအနေနဲ့ မြောက်ဥက္ကလာပ ပြည်သူ့ဆေးရုံကြီး ၊ ဓာတ်ခွဲဌာန၏ ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများကို သုတေသနပြုလုပ်ခြင်း တစ်ခုဆောင်ရွက်လိုပါသည်။ သုတေသနအကြောင်းကို ရှင်းပြပြီး သင့်အားပါဝင်ရန် ဖိတ်ခေါ်လိုပါသည်။ သင့်အနေနှင့် မရှင်းလင်းသည်များရှိပါက မေးမြန်းနိုင်ပါသည်။

၂။ ရည်ရွယ်ချက်

ဤသုတေသန၏ ရည်ရွယ်ချက်မှာ မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီး ၊ ဓာတ်ခွဲဌာန၏ ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများ မည်သို့ရှိမည်ကို လေ့လာလိုပါသည်။

၃။ သုတေသနဆောင်ရွက်ပုံအမျိုးအစား

ဤသုတေသနသည် သင်ကိုယ်တိုင် မေးခွန်းများကို ဖတ်၍ ဖြေဆိုရမည်ဖြစ်ပြီး မိနစ် (၃၀) ခန့် ကြာမြင့်မည်ဖြစ်ပါသည်။

၄။ ပါဝင်မည့်သူများရွေးချယ်ခြင်း

သင့်အား ဤသုတေသနတွင်ပါဝင်ရန် ဖိတ်ခေါ်ခြင်းမှာ မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီး ၊ ဓာတ်ခွဲဌာန၏ ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများအပေါ် အထောက်အကူပြုနိုင်မည်ဟု ယူဆ၍ ဖြစ်ပါသည်။

၅။ မိမိဆန္ဒအလျောက်ပါဝင်ခြင်း

ဤသုတေသနတွင်သင်ပါဝင်ကူညီခြင်းသည်သင်၏သဘောဆန္ဒအလျောက်သာဖြစ်ပါတယ်။ယခုပါဝင်ပြီးနောက်ပိုင်းမပါဝင်ချင်လည်းရပါသည်။

၆။ လုပ်ဆောင်ပုံ

ဤသုတေသနတွင်ပါဝင်ဖို့သင်သဘောတူမည်ဆိုလျှင်မိနစ်(၃၀)ခန့်ကြာမြင့်မည်ဖြစ်ပါသည်။ သင်သည်သီးသန့်နေရာတစ်ခုမှာဖြေဆိုရမှာဖြစ်ပြီးသင်၏လူမှုရေးအချက်အလက်များ၊လုပ်ငန်းခွင်နှင့်ဆိုင်သော အချက်အလက်များနှင့် မိမိတို့လုပ်ငန်းခွင်နှင့်ဆိုင်သော အခက်အခဲများ မည်သို့ရှိမည်ကို လေ့လာလိုပါသည်။မေးခွန်းများဖြေဆိုရာတွင်စိတ်အနှောင့်အယှက်ဖြစ်၍မဖြေဆိုလိုသောမေးခွန်းများရှိပါက သင့်ဆန္ဒအလျောက် မဖြေဆိုဘဲ ငြင်းဆိုနိုင်ပါသည်။

၇။ အကျိုးကျေးဇူးများ

ဤသုတေသနတွင် ပါဝင်သောကြောင့် သင့်အတွက် တိုက်ရိုက်အကျိုးကျေးဇူးရရှိမည် မဟုတ်ပါ။ သို့သော် သင်ပါဝင်မှုသည် ဓာတ်ခွဲခန်း၏အခက်အခဲများကို ပြုပြင်ရေးလုပ်ဆောင်မှုများအပေါ်တွင် အထောက်အကူဖြစ်စေပါသည်။

၈။ အချက်အလက်များ သိမ်းဆည်းထားရှိခြင်း

ဤသုတေသနမှကောက်ယူရရှိသည့် အချက်အလက်များကို လုံခြုံစွာထားရှိမှာဖြစ်ပါသည်။ သင့်ထံမှ သိရှိရသည့်အချက်များကို သုတေသနအဖွဲ့မှ တစ်ပါး အခြားမည်သူမှ မသိစေရပါ။

၉။ သုတေသနရလဒ်များကို ဖြန့်ဝေခြင်း

ဤသုတေသန၏ တွေ့ရှိချက်များကို စိတ်ဝင်စားသူများမှ သိရှိနိုင်စေရန် ရလဒ်များကိုသာ ဖြန့်ဝေမှာဖြစ်ပါသည်။

၁၀။ ဆက်သွယ်ရမည့်ပုဂ္ဂိုလ်

အကြောင်းတစ်စုံတစ်ရာမေးမြန်းလိုလျှင် ဒေါက်တာသီတာအောင် ၊ ဖုန်း ၀၉-၂၁၀၀၇၄၇ ကိုဆက်သွယ်နိုင်ပါသည်။ ဤသုတေသနကို လူပုဂ္ဂိုလ်များအပေါ် သုတေသနပြုမှုဆိုင်ရာ ကျင့်ဝတ်ကော်မတီမှ ခွင့်ပြုချက်ရရှိပြီးဖြစ်ပါသည်။

အပိုင်း(ခ) သုတေသနတွင်ပါဝင်ရန် သဘောတူညီမှုပုံစံ

ကျွန်ုပ်သည် မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီး ၊ ဓာတ်ခွဲဌာန၏ ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများလေ့လာသော သုတေသနတွင် ပါဝင်ရန် ဖိတ်ခေါ်ခြင်းခံရပါသည်။ ဤသုတေသနတွင် ပါဝင်သောကြောင့် ကျွန်ုပ်အတွက် တိုက်ရိုက်အကျိုးကျေးဇူး မရရှိပါ။ ကျွန်ုပ်သည် ကိုယ်တိုင်မေးခွန်းများကို ဖတ်၍ ဖြေဆိုရမည်ဖြစ်ပြီး မိနစ်(၃၀)ခန့် ကြာမြင့်မည်ဖြစ်ကြောင်းနှင့် လူမှုရေး အချက်အလက်များ ၊ လုပ်ငန်းခွင်နှင့်ဆိုင်သော အချက်အလက်များ ၊ မိမိတို့လုပ်ငန်းခွင်နှင့် ဆိုင်သော အခက်အခဲများ မည်သို့ ရှိမည်ကို မေးမြန်းမှာဖြစ်ကြောင်းသိရှိရပါသည်။ ဤသုတေသနတွင် ကျွန်ုပ်သည် အထက်ဖော်ပြချက်များကို ဖတ်ရှုပြီးဖြစ်ပါသည်။ မရှင်းလင်းသည့် မေးခွန်းများကိုလည်း မေးမြန်းနိုင်၍ ၎င်းတို့ကို ကျွန်ုပ်သည် ကျေနပ်စွာဖြေဆိုပေးပါသည်။ ကျွန်ုပ်ဆန္ဒအလျောက် ဤသုတေသနတွင် ပါဝင်ရန် သဘောတူပါသည်။

သုတေသနတွင်ပါဝင်သူအမည် ----------

သုတေသနတွင်ပါဝင်သူလက်မှတ် ----------

ရက်စွဲ ----------

အပိုင်း(၈) အသေးစိတ်မေးမြန်းခြင်းအတွက်သုတေသနမေးခွန်းလွှာပုံစံ

မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီး ၊ လူနာများ၏ ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများကို သုတေသနပြုလုပ်ခြင်း

အဓိကသုတေသီအမည် - ဒေါက်တာသီတာအောင်

ဌာန - ဆေးရုံအုပ်ချုပ်မှုပညာမဟာဘွဲ့သင်တန်းသူ ၊

ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ် ၊ ရန်ကုန်။

သုတေသနခေါင်းစဉ် မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီးဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများကို သုတေသနပြုလုပ်ခြင်း

အပိုင်း(က) သုတေသနနှင့်သက်ဆိုင်သောအချက်များ

၁။ မိတ်ဆက်နိဒါန်း

ကျွန်မသည် ဒေါက်တာသီတာအောင် ၊ ဆေးရုံအုပ်ချုပ်မှုပညာမဟာဘွဲ့သင်တန်းသူ ၊ ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ် ၊ ရန်ကုန်မှ ဖြစ်ပါတယ်။ ကျွန်မအနေနဲ့ မြောက်ဥက္ကလာပ ပြည်သူ့ဆေးရုံကြီး ၊ လူနာများ၏ ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများကို သုတေသနပြုလုပ်ခြင်း တစ်ခုဆောင်ရွက်လိုပါသည်။ သုတေသနအကြောင်းကို ရှင်းပြပြီး သင့်အားပါဝင်ရန် ဖိတ်ခေါ်လိုပါသည်။ သင့်အနေနှင့် မရှင်းလင်းသည်များရှိပါက မေးမြန်းနိုင်ပါသည်။

၂။ ရည်ရွယ်ချက်

ဤသုတေသန၏ ရည်ရွယ်ချက်မှာ မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီး ၊ လူနာများ၏ ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများ မည်သို့ရှိမည်ကို လေ့လာလိုပါသည်။

၃။ သုတေသနဆောင်ရွက်ပုံအမျိုးအစား

ဤသုတေသနသည် သင်ကိုယ်တိုင် မေးခွန်းများကို ဖတ်၍ ဖြေဆိုရမည်ဖြစ်ပြီး မိနစ် (၁၅) ခန့် ကြာမြင့်မည်ဖြစ်ပါသည်။

၄။ ပါဝင်မည့်သူများရွေးချယ်ခြင်း

သင့်အား ဤသုတေသနတွင်ပါဝင်ရန် ဖိတ်ခေါ်ခြင်းမှာ မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီး ၊ လူနာများ၏ ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ၊ သုံးစွဲမှုများနှင့် အခက်အခဲများအပေါ် အထောက်အကူပြုနိုင်မည်ဟု ယူဆ၍ ဖြစ်ပါသည်။

၅။ မိမိဆန္ဒအလျောက်ပါဝင်ခြင်း

ဤသုတေသနတွင်သင်ပါဝင်ကူညီခြင်းသည်သင်၏သဘောဆန္ဒအလျောက်သာဖြစ်ပါတယ်။ ယခုပါဝင်ပြီးနောက်ပိုင်းမပါဝင်ချင်လည်းရပါသည်။

၆။ လုပ်ဆောင်ပုံ

ဤသုတေသနတွင်ပါဝင်ဖို့သင်သဘောတူမည်ဆိုလျှင်မိနစ်(၁၅)ခန့်ကြာမြင့်မည်ဖြစ်ပါသည်။ သင်သည်သီးသန့်နေရာတစ်ခုမှာဖြေဆိုရမှာဖြစ်ပြီးသင်၏လူမှုရေးအချက်အလက်များ၊လုပ်ငန်းခွင်နှင့် ဆိုင်သော အချက်အလက်များနှင့် မိမိတို့လုပ်ငန်းခွင်နှင့်ဆိုင်သော အခက်အခဲများ မည်သို့ရှိမည်ကို လေ့လာလိုပါသည်။မေးခွန်းများဖြေဆိုရာတွင်စိတ်အနှောင့်အယှက်ဖြစ်၍မဖြေဆိုလိုသောမေးခွန်းများ ရှိပါက သင့်ဆန္ဒအလျောက် မဖြေဆိုဘဲ ငြင်းဆိုနိုင်ပါသည်။

၇။ အကျိုးကျေးဇူးများ

ဤသုတေသနတွင် ပါဝင်သောကြောင့် သင့်အတွက် တိုက်ရိုက်အကျိုးကျေးဇူးရရှိမည် မဟုတ်ပါ။ သို့သော် သင်ပါဝင်မှုသည် ဓာတ်ခွဲခန်း၏အခက်အခဲများကို ပြုပြင်ရေးလုပ်ဆောင်မှုများ အပေါ်တွင် အထောက်အကူဖြစ်စေပါသည်။

၈။ အချက်အလက်များ သိမ်းဆည်းထားရှိခြင်း

ဤသုတေသနမှကောက်ယူရရှိသည့် အချက်အလက်များကို လုံခြုံစွာထားရှိမှာဖြစ်ပါသည်။ သင့်ထံမှ သိရှိရသည့်အချက်များကို သုတေသနအဖွဲ့မှ တစ်ပါး အခြားမည်သူမှ မသိစေရပါ။

၉။ သုတေသနရလဒ်များကို ဖြန့်ဝေခြင်း

ဤသုတေသန၏ တွေ့ရှိချက်များကို စိတ်ဝင်စားသူများမှ သိရှိနိုင်စေရန် ရလဒ်များကိုသာ ဖြန့်ဝေမှာဖြစ်ပါသည်။

၁၀။ ဆက်သွယ်ရမည့်ပုဂ္ဂိုလ်

အကြောင်းတစ်စုံတစ်ရာမေးမြန်းလိုလျှင် ဒေါက်တာသီတာအောင် ၊ ဖုန်း ၀၉-၂၁၀၀၇၄၇ ကိုဆက်သွယ်နိုင်ပါသည်။ ဤသုတေသနကို လူပုဂ္ဂိုလ်များအပေါ် သုတေသနပြုမှုဆိုင်ရာ ကျင့်ဝတ်ကော်မတီမှ ခွင့်ပြုချက်ရရှိပြီးဖြစ်ပါသည်။

အပိုင်း(ဃ) အသေးစိတ်မေးမြန်းခြင်းတွင် ပါဝင်ရန် သဘောတူညီမှုပုံစံ

ကျွန်ုပ်သည် မြောက်ဥက္ကလာပပြည်သူ့ဆေးရုံကြီးတွင် ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများ ပြုလုပ်ရာတွင် ကြုံတွေ့ရမည့် အခက်အခဲများကို ဆန်းစစ်သော သုတေသနတွင် ပါဝင်ဆွေးနွေးရန် ဖိတ်ခေါ်ခြင်းခံရပါသည်။ ဤသုတေသနတွင်ပါဝင်သောကြောင့်ကျွန်ုပ်အတွက်တိုက်ရိုက်အကျိုး ကျေးဇူး မရရှိပါ။ ကျွန်ုပ်သည် ဆွေးနွေးရန် မေးခွန်းများကို သေချာစွာ ဖတ်ရှုပြီးဖြစ်ပါသည်။ ၎င်းတို့ကို ကျွန်ုပ်သည် ကျေနပ်စွာဖြင့် ဆွေးနွေးပေးပါသည်။ ကျွန်ုပ် ဆန္ဒ အလျောက် ဤသုတေသနတွင် ပါဝင်ရန် သဘောတူပါသည်။

သုတေသနတွင်ပါဝင်သူအမည် ----------

သုတေသနတွင်ပါဝင်သူလက်မှတ် ----------

ရက်စွဲ ----------

Informed Consent Form

Institutional Review Board

University of Public Health, Yangon

Name of Investigator – Dr Thidar Aung

Title of research - "Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital"

Part (A) Informed consent form

1. Introduction

I am Dr Thidar Aung, post graduate student of master of hospital administration at University of Public Health, Yangon. I am doing research on "Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital"

2. Purpose of the research

This study is to assess "Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital".

3. Type of Research Intervention

This research will involve your participation in interviewing according to interview guideline.

4. Participant Selection

You are being invited to take part in this research because we feel that you will interest in "Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital".

5. Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether participate or not.

6. Procedure

I would like to invite you to take part in this research project. If you accept, you have to interview about thirty minutes. It will be taken at a place which is comfortable for you. The interview will include challenges and utilizing laboratory services.

7. Benefits

Participation in this study will not benefit the participant directly but your participation is likely to help us find out more about how to solve the problem of laboratory services.

8. Confidentiality

I will not be sharing information about your participation in this study to anyone outside. The information that I collect from this research project will be kept private.

9. Sharing the Results

The knowledge that I get from research will be only to the persons who have the responsibility for this study. I will then publish the results to be read only by the interested people.

10. Who to contact

If there are any queries before, during and after the study you can directly contact the investigator Dr Thidar Aung, Phone – 092100747 or via email drthidaraung.sbo@ gmail.com. This proposal had been reviewed and approved by the Institutional Review Board, University of Public Health, Yangon which is a committee whose task is to make sure that research participants are protected from harm. If you wish to find out more about the committee, contact the secretary of the committee at University of Public Health, Yangon, No. 246, Myoma Kyaung Street, Latha Township, Yangon, 11311. Office phone +95 1395213, +95 1395214 ext:23/25.

Part (B) Consent form

I have been invited to participate in research about “Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital”. I know that I will have to interview about thirty minutes. I am aware that there may be no benefit to me personally. The interview includes challenges and utilizing laboratory services. I consent voluntarily to be a participant in this study.

Name of participant ----------

Signature of participant ----------

Date ----------

Part (C) Informed consent form for in-depth interview

1. Introduction

I am Dr. Thidar Aung post graduate student of master of hospital administration at University of Public Health, Yangon. I am doing research on "Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital"

2. Purpose of the research

This study is to assess "Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital".

3. Type of Research Intervention

This research will involve your participation for in-depth interview about fifteen minutes.

4. Participant Selection

You are being invited to take part in this research because we feel that you will interest in "Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital".

5. Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether participate or not.

6. Procedure

I would like to invite you to take part in this research project. If you accept, you have to answer for in depth interview about fifteen minutes. It will be taken at a place which is comfortable for you. The interview will include challenges and utilizing laboratory services**.** You do not have to answer any question or take part in the discussion if you feel the issue(s) are too personal or if talking about them makes you uncomfortable.

7. Benefits

Participation in this study will not benefit the participant directly but your participation is likely to help us find out more about how to solve the problem of utilizing laboratory services.

8. Confidentiality

I will not be sharing information about your participation in this study to anyone outside. The information that I collect from this research project will be kept private.

9. Sharing the Results

The knowledge that I get from research will be only to the persons who have the responsibility for this study. I will then publish the results to be read only by the interested people.

10. Who to contact

If there are any queries before, during and after the study you can directly contact the investigator Dr Thidar Aung, Phone – 092100747 or via email drthidaraung.sbo@ gmail.com. This proposal had been reviewed and approved by the Institutional Review Board, University of Public Health, Yangon which is a committee whose task is to make sure that research participants are protected from harm. If you wish to find out more about the committee, contact the secretary of the committee at University of Public Health, Yangon, No. 246, Myoma Kyaung Street, Latha Township, Yangon, 11311. Office phone +95 1395213, +95 1395214 ext:23/25.

Part (D) Consent form for in depth interview

I have been invited to participate in research about "Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital". I am aware that there may be no benefit to me personally and that I will be paid only for my time spent. I have read the facts thoroughly. I have been answered to my satisfaction. I consent voluntarily to be a participant in this study.

Name of participant ----------

Signature of participant ----------

Date ----------

Annex (3) KII and IDI Guidelines (Myanmar and English)

"Utilization and challenges of laboratory services in North Okkalapa General and Teaching Hospital"

GUIDELINE FOR KII (Key Informant Interview)

ရောဂါဗေဒဌာန၏ ဝန်ဆောင်မှုပေးသော လုပ်ငန်းများအား(ဝန်ဆောင်မှုပေးသူများ)အတွက်လမ်းညွှန် မိတ်ဆက်စကားပြောရန်

ကျွန်မသည် ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ်မှ MHA သင်တန်းသူဖြစ်ပါသည်။ Laboratory services နှင့်ပတ်သက်၍ စာတမ်းပြုစုမည့်သူဖြစ်ပါတယ်။ ပိုမိုကောင်းမွန်သော Laboratory services ဖြစ်လာစေရန် ( ) ၏ သဘောထားအမြင်နဲ့ အကြံပြုချက်များကိုရယူလိုပါတယ်။( )မှ ဖြေကြားပေးသောအကြံဉာဏ်များမှာ အလွန်အသုံးဝင်မှာဖြစ်ပါတယ်။အချိန်ပေးပြီးဖြေကြားပေးတဲ့အတွက်ကျေးဇူးတင်ပါတယ်။စိတ်ထဲရှိတဲ့အတိုင်းသိထားတဲ့အတိုင်းထင်မြင်ချက်များကိုလွတ်လပ်စွာဆွေးနွေးပေးစေလိုပါတယ်။ဆွေးနွေးချက်များကိုအသံသွင်းခွင့်ပြုပါ။ကျွန်မတို့မကြားလိုက်ရတဲ့လွတ်သွားသောအကြောင်းအရာတွေကို ပြန်ဖွင့်ပြီးနားထောင်ချင်လို့ဖြစ်ပါတယ်။အဲဒီဆွေးနွေးချက်ကို Laboratory services တိုးတက်ရေးကိစ္စတွေမှာပဲအသုံးပြုမှာဖြစ်ပါတယ်။

For health care providers (Laboratory department and Administrator)

(က) နောက်ခံသတင်းအချက်အလက်

- အသက်
- ကျား/မ
- ဘွဲ့
- ရာထူး
- စုစုပေါင်းလုပ်သက်
- ဤဆေးရုံတွင် တာဝန်ထမ်းဆောင်သောလုပ်သက်

(ခ)ဓါတ်ခွဲခန်းတွင်ရှိသောဝန်ထမ်းအင်အား၊ဝန်ထမ်းရေးရာနှင့်ပတ်သက်၍လိုအပ်ချက်များ။

(၁) ဓါတ်ခွဲခန်း၏ဝန်ထမ်းအင်အားနှင့်ပတ်သက်၍လုံလောက်မှုရှိပါသလား။ အခက်အခဲများကိုပြောပြပါ။

(၂) ဓါတ်ခွဲခန်း၏ဝန်ဆောင်မှုပေးရသော လုပ်ငန်းနှင့်ပတ်သက်၍ အခက်အခဲများကို ပြောပြပါ။ (၃) ဓါတ်ခွဲခန်းတွင် လုပ်ငန်းတာဝန်ခွဲဝေချထားမှုနှင့် ပတ်သက်၍ အခက်အခဲများ ကိုပြောပြပါ။

(၄) ဓါတ်ခွဲကျွမ်းကျင်နှင့် ဓါတ်ခွဲမှူးများ၏ အရည်အသွေးမြှင့်တင်ခြင်းနှင့် ပါတ်သတ်၍ သင်တန်းပေးမှုများကို ပြောပြပါ။

- အကယ်၍ရှိလျှင် ဘယ်နှစ်ကြိမ်ပေးပါသလဲ။ ဘယ်လိုသင်တန်းတွေလဲ
- မရှိလျှင် ဘာကြောင့်လဲ။

(၅) ဓါတ်ခွဲကျွမ်းကျင်၊ ဓါတ်ခွဲမှူးများနှင့် ပတ်သက်၍ ဘယ်လိုစိန်ခေါ်မှုများ ကြုံဖူးပါသလဲ။

(၆) ဓါတ်ခွဲကျွမ်းကျင်၊ ဓါတ်ခွဲမှူးများ၏ လုပ်ငန်းခွင်တွင် တည်မြဲရေးအတွက် ဘယ်လိုလုပ်သင့်တယ်လို့ ထင်ပါသလဲ။

(၇) ဓါတ်ခွဲကျွမ်းကျင်၊ ဓါတ်ခွဲမှူးများ၏ ကျွမ်းကျင်မှုနှင့် ဝန်ဆောင်မှုများ တိုးတက်အောင် ဘယ်လိုလုပ်သင့်တယ်လို့ ထင်ပါသလဲ။

(ဂ) ဆေးရုံဓါတ်ခွဲခန်းအဆောက်အဦးနှင့် လိုအပ်ချက်များ

(၁) လျှပ်စစ်မီး ပြတ်တောက်မှုဖြစ်သွားပါက ဘယ်လိုစီစဉ်ထားပါသလဲ။ အခက်အခဲရှိပါ သလား။

- အခက်အခဲရှိလျှင် ဘာတွေလဲ။
- မရှိလျှင် ဘာကြောင့်လဲ။

(၂) ရေ ၂၄နာရီ ရရှိအောင် ဘယ်လိုစီစဉ်ထားပါသလဲ။

(၃) အခြားအခက်အခဲများရှိလျှင် ပြောပြပေးပါ။ (ဥပမာ-သဘာဝဘေး၊ ကြွက်)

(ဃ) ဓါတ်ခွဲဌာန၏ အခြေခံလိုအပ်ချက်များ

(၁) ဓါတ်ခွဲခန်း၏ အခြေခံလိုအပ်ချက်များနှင့် ပတ်သက်၍ ဘယ်လိုစိန်ခေါ်မှုများ ကြုံဖူးပါ သလဲ။

(၂) ဓါတ်ခွဲခန်း၏ အခြေခံလိုအပ်ချက်များနှင့် ပတ်သက်၍ တိုးတက်အောင် ဘယ်လိုပြုလုပ်ရမည်ဟု ထင်မြင်ပါသလဲ။

(င) ဓါတ်ခွဲခန်းပစ္စည်းများနှင့် အသုံးအဆောင်စီမံထားမှု

(၁) ဓါတ်ခွဲခန်းသုံးပစ္စည်းများအား ဘယ်လိုသိမ်းထားပါသလဲ။

(၂)ခါတ်ခွဲခန်းပစ္စည်းများစက်ကိရိယာများအသုံးပြုရန်ရရှိခြင်း၊ထိန်းသိမ်းခြင်းများနှင့် ပတ်သက်၍ စိန်ခေါ်မှုများ ဘယ်လိုရှိပါသလဲ။

(စ) ခါတ်ခွဲခန်းအန္တရာယ်ကင်းရန်အတွက် ကာကွယ်ထားရှိမှု

(၁) ခါတ်ခွဲခန်းသုံးစွန့်ပစ်ပစ္စည်းများအတွက်ဘယ်လိုစီမံထားပါသလဲ။

(၂)ခါတ်ခွဲခန်းဝန်ထမ်းများအားလုပ်ငန်းခွင်အန္တရာယ်ကင်းအောင်ဘယ်လိုကာကွယ်မှုများလုပ်ထားပါသလဲ။

(၃)ခါတ်ခွဲခန်းသုံးပစ္စည်းများ၏အန္တရာယ်နှင့်ပတ်သက်၍ဘယ်လိုစိန်ခေါ်မှုများနှင့်ကြုံတွေ့ရပါ သလဲ။

(၄) ခါတ်ခွဲခန်းအန္တရာယ်မဖြစ်အောင်သတ်မှတ်ထားသောလမ်းညွှန်ချက်များရှိပါသလား။

(၅) ခါတ်ခွဲခန်းအန္တရာယ်ကင်းစေခြင်းနှင့် ပတ်သက်၍ သင့်ထင်မြင်ချက်ကို ပြောပြပေးပါ။

- ဘယ်လိုဖြေရှင်းမလဲ။

(ဆ) စမ်းသပ်စစ်ဆေးမှုအတွက် နမူနာများစုဆောင်းခြင်း

(၁) စမ်းသပ်စစ်ဆေးမှုအတွက်နမူနာများ (Samples) စုဆောင်းခြင်းနှင့်ပတ်သက်၍ဘယ်လိုစီမံထားပါသလဲ။

(၂) ၎င်းနှင့်ပတ်သက်၍သင်တန်းများပေးထားပါသလား၊လိုက်နာမှုရှောရှိပါသလား။

(၃) ခါတ်ခွဲစမ်းသပ်စစ်ဆေးပြီးသော အဖြေလွှာများကို ပြန်လာမယူခြင်းများ ရှိပါသလား။

- ရှိလျှင် ဘာကြောင့်လို့ ထင်ပါသလဲ။
- ဘာအကြံဉာဏ်များ ပေးချင်ပါသလဲ။

(ဇ) ဆေးယဉ်ပါးခြင်း။

(၁) ဆေးယဉ်ပါးခြင်း အဖြေရရှိမှုအား ဆေးကုသမှုပေးသော အဆောင်များသို့ သိရှိအောင် ဘယ်လိုပြုလုပ်ပါသလဲ။

(၂) ရောဂါကူးစက်မှု ထိန်းချုပ်မှုနှင့် ပတ်သက်၍ ဘယ်လိုစီမံထားပါသလဲ။

(ဈ) အကြံပြုချက်

ဤခါတ်ခွဲခန်းတိုးတက်အောင် ဘာအကြံဉာဏ်ပေးမလဲ။

GUIDELINE FOR KII (Key Informant Interview)

Name of Hospital-NOGTH

I am a student of University of Public Health. Now, I would like to ask you a few questions related to challenges of laboratory department and utilizing laboratory services for my research. So, I would like to invite you to participate with me. Your personal data will be confidential except the member of this research. If you allow, I would like to record your voice record for checking. The voice record will be deleted after research. The interview would be used for improving laboratory services.

For health care providers (Laboratory department and Administrator)

A. Background information

- Age
- Gender
- Qualification
- Designation
- Years of total service
- Years of service in this hospital

B. Perception on the human resources of laboratory

1. How about the human resources have enough in laboratory? Explain challenges about this.
2. what challenges have you encountered in management of workload?
3. what problem do you have on duty allocation in laboratory?
4. How about the training given to lab technician to upgrade the skill and to improve their performance?

If yes, How many times and what training?

If no, why?

5. What challenges have you encountered in the human resources of lab technicians?
6. what is your opinion to sustain laboratory technicians?
7. What is your opinion to improve the skill and services of lab technicians?

C. Perception of hospital laboratory building and facilities

1. What is your plan for back up electricity?

Are there any problems?

If yes, what are they?

If no, why?

2. What is your plan for 24 hr running water?
3. Are there any other difficulties? Mention them.

D. Perception of laboratory infrastructure and basic amenities

1. What challenges have you encountered in infrastructure and basic amenities of the laboratory?
2. What is your opinion to improve the infrastructure and basic amenities of the laboratory?

E. Perception on the management of equipment, reagents

1. How do you store the lab equipment, device, consumables and reagents?
2. What challenges have you encountered in accessibility of the lab equipment and reagents?

F. Perception on the safety measure

1. How do you plan for waste disposal of laboratory?
2. How do you prevent the laboratory staff from any occupation hazard?
3. What challenges have you encountered in safety of the laboratory?
4. Do you have any SOP for biosafety of the laboratory?

If yes, obey SOP?

5. What is your opinion to improve the safety of the laboratory?

How can you solve it?

G. Perception on sample collection methods

1. How do you plan about sample collecting?
2. How about the training given for sample collection?

If yes, follow?

3. Had you experience the problem on remaining patient's laboratory test results requested by the HCP?

If yes, what do you think? Give any suggestion?

H. Antimicrobial resistance

1. How do you arrange to know for wards about antimicrobial resistance results?
2. What is your plan for infection control?

I. Any suggestion

What do you suggest to improve this laboratory?

GUIDELINE FOR KII (Key Informant Interview)

For health care providers (Clinicians)

(က) နောက်ခံသတင်းအချက်အလက်

- အသက်
- ကျား/မ
- ဘွဲ့
- ရာထူး
- စုစုပေါင်းလုပ်သက်
- ဤဆေးရုံတွင် တာဝန်ထမ်းဆောင်သောလုပ်သက်

(ခ) ဓါတ်ခွဲစမ်းသပ်မှု ဝန်ဆောင်မှုနှင့် ပတ်သက်၍သဘောထားအမြင်။

(၁) ဆေးကုသရာတွင်ဓါတ်ခွဲစမ်းသပ်စစ်ဆေးခြင်း၏အခန်းကဏ္ဍာကိုပြောပြပါ။

အခြေခံဓါတ်ခွဲစမ်းသပ်မှုများသည်သင်၏လူနာအတွက်ဘယ်လိုအထောက်အကူပြုပါသလဲ။

(၂) ဓါတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများပြုလုပ်ရန်ပြဋ္ဌာန်းထားသောလမ်းညွှန်ချက်များ ရှိပါသလား။ ရှိလျှင်, လမ်းညွှန်ချက်ကိုဘယ်လိုဆုံးဖြတ်ချက်ချပါလဲ။

(၃) ဓါတ်ခွဲစမ်းသပ်စစ်ဆေးမှုများကိုလျှော့ချနိုင်ရန်အားထုတ်ရာတွင်သင်ဘယ်လို ထင်ပါသလဲ။

(၄) ဆေးရုံ၏ဓါတ်ခွဲစမ်းသပ်စစ်ဆေးခြင်းများကိုအသုံးပြုရာတွင်ဘာအခက်အခဲများ ရှိပါသလဲ။

(၅) အကျိုးမရှိစွာအသုံးပြုသောဓါတ်ခွဲစမ်းသပ်မှုများ(ဓါတ်ခွဲအဖြေလာမရွေးခြင်း)ကို ဘယ်လိုထင်မြင်ပါသလဲ။ထိုအတွက်ဘာအကြံညဏ်များပေးချင်ပါသလဲ။

(၆) ဆေးယဉ်ပါးခြင်းများနှင့်ပတ်သက်၍ဆေးကုသမှုတွင်ဘယ်လိုအခန်းကဏ္ဍတွင် ပါဝင်ပါသလဲ။ ဓါတ်ခွဲခန်းမှဆေးယဉ်ပါးခြင်းတွေ့ရှိချက်အကြောင်းအရာများကိုပေးပါသလား။

(ဂ) အကြံပြုချက်

ဓါတ်ခွဲခန်းတိုးတက်အောင်ဘာအကြံညဏ်များပေးချင်ပါလဲ။

GUIDELINE FOR KII (Key Informant Interview)

For health care providers (Clinicians)

A. Background information

- Age
- Gender
- Qualification
- Designation
- Years of total service
- Years of service in this hospital

B. Perception on laboratory services

1. What is the role of laboratory testing and how does routine lab testing help your patients?
2. Do you have protocol for ordering tests? If so how did you decide this protocol?
3. How do you feel about efforts to reduce or limit clinical testing?
4. What are the difficulties in utilizing hospital laboratory tests?
5. How do you think about the inefficient use laboratory tests in your hospital? What opinion do you give for this?
6. What is the role of antimicrobial resistance in your practice and do you get any report about AMR from laboratory?

C. Suggestion

What do you suggest to improve this laboratory?

GUIDELINE FOR IDI (In-Depth Interview)

လူနာများ၏ ဓါတ်ခွဲစမ်းသပ်စစ်ဆေးခြင်းနှင့် ဓါတ်ခွဲဝန်ဆောင်မှုနှင့် ပတ်သက်၍ ကြုံတွေ့နေရသော အခက်အခဲများအကြောင်း မေးမြန်းသော မေးခွန်းလွှာ

(က) နောက်ခံသတင်းအချက်အလက်

- အသက် (ပြည့်ပြီးနှစ်) ----------
- ကျား/မ ----------
- အလုပ်အကိုင် ----------
- ရောဂါနောက်ကြောင်းရာဇဝင် ----------
- ဆေးရုံတက်ရခြင်းအကြောင်းအရင်း ----------

ဓါတ်ခွဲစမ်းသပ်မှုနှင့် ပတ်သက်၍ ဝန်ဆောင်မှုရယူခြင်း

(ခ) ဓါတ်ခွဲဌာန

(၁) ဓါတ်ခွဲစမ်းသပ်မှုနှင့် ပတ်သက်၍ ဝန်ဆောင်မှုရရှိရန်အတွက် အချိန် ဘယ်လောက်ကြာအောင် စောင့်ရပါသလဲ။

(၂) ဓါတ်ခွဲစမ်းသပ်ရာတွင် ငွေကြေးကုန်ကျမှုရှိပါသလား

(၃) ဓါတ်ခွဲဝန်ထမ်းများ၏ လူနာများအပေါ်ထားရှိသော သဘောထားကို ပြောပြပေးပါ။

(၄) ဓါတ်ခွဲခန်းစမ်းသပ်ရာတွင် အခက်အခဲများရှိပါသလား။ ရှိလျှင်ပြောပြပေးပါ။

(၅) ဓါတ်ခွဲခန်းစမ်းသပ်မှု၏ ဝန်ဆောင်မှုနှင့်ပတ်သက်၍ အခက်အခဲများရှိပါသလား။ ရှိလျှင်ပြောပြပေးပါ။

(လိုအပ်လျှင် ဆက်မေးရန် -

ဥပမာ- လူနာထံမှ သွေးထုတ်ခြင်း၊ သွေးအဖြေပို့ခြင်း၊ သွေးအဖြေရွေးယူခြင်း၊ ဓါတ်ခွဲခန်းသို့သွားလာခြင်း၊ ဆေးရုံတွင် သွေးစစ်၊ ဆီးစစ်၊ အသားစယူခြင်း စသည့် ဓါ တ်ခွဲခန်းဝန်ဆောင်မှုများနှင့် ပတ်သက်၍ ပိုမိုကောင်းမွန်စေရန်

(ဂ) အကြံပြုချက်

အကြံဉာဏ်ပေးချင် တာများ ရှိပါသလား။ ပြောပြပါ။

GUIDELINE FOR IDI (In-Depth Interview)

For Patient/ Patient's attendant

A. Background information of patients

- Age
- Gender
- Occupation
- Background disease
- Cause of admission

A. Laboratory department

1. How long you waiting for the laboratory service?
2. How much cost for the laboratory service?
3. Generally, how do you perceive the attitudes of Laboratory staff towards patients?
4. Describe the difficulties in utilizing the laboratory services?

If yes, state your difficulty.

5. Describe the difficulties in receiving the laboratory services?

If yes, state your difficulty.

(Probe- eg. The behavior of health staff during sample collection, patient's blood, urine and biopsy testing, transportation difficulties to the laboratory, any other difficulty in getting the test result, etc)

B. Suggestion

Any suggestion to improve this laboratory?

Annex (4) Gantt Chart

Month	August				September				October				November				December			
Week	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Protocol preparation																				
Protocol defend																				
Pilot study – Preparation for data collection																				
Data collection																				
Data entry and analysis																				
Preparation for Grand presentation																				
Thesis preparation																				
Submission of thesis (Draft)																				
Thesis defend																				
Correction and Submission of thesis																				

Annex (5) Other Relevant Documents

Price of the laboratory tests in NOGTH

No	Test	Price (MMK)
1	Blood Glucose	300
2	Hb A1C	6000
3	Electrolytes	3000
4	Lipid Profile	3900
5	L F T	1500
6	T & DP	600
7	CK MB	5000
8	Uric Acid	600
9	Creatinine	400
10	Urea	500
11	UCG	200
12	Amylase	1500
13	Semen Analysis	1000
14	CP (Auto)	4000
15	ESR	400
16	Reticulocyte Count	500
17	BT & CT	300
18	Singer's Test	1500
19	G6PD	3000
20	Blood Grouping A B O	300
21	Blood Grouping Rh	300
22	RA	1000
23	C & S	3000
24	Z N	500
25	Gram	500
26	Blood MF	500
27	Blood MP	500
28	A S O	600
29	Widal Test	1000

30	CRP	900
31	HBs Ag	500
32	Anti HCV Ab	2000
33	HIV Ab	2000
34	ICT Syphilis	500
35	Urine RE	500
36	Stool RE	500
37	Urine Bilirubin, Urobilinogen, Bile	500
38	Coomb's Test	3000
39	MP ICT	3500
40	Fluid RE	1500
41	CSF RE	2000
42	Biopsy	3000/4000/6000
43	Cytology	2000
44	Vitamin D	9000
45	PSA	8000
46	D-Dimer	12000
47	Troponin T	15000

Tests available in NOGTH laboratory

No	Name of test
1	Urea
2	Creatinine
3	Electrolytes
4	Total Protein
5	Albumin
6	Lipid profile
7	Liver function test
8	Glucose
9	Uric acid
10	CRP (Qualitative, Quantitative)
11	Serum Iron
12	Serum amylase
13	Complete blood picture (Auto)
14	ESR
15	Retic count
16	Hb%
17	Platelet count
18	BT & CT
19	Blood Grouping and Rh
20	Malaria (ICT, Film)
21	HBs Antigen
22	HCV Antibody
23	Retroviral Antibody
24	VDRL
25	Stool RE
26	Urine RE
27	Gram Stain
28	ZN Stain
29	ASO
30	RA

31	Widal
32	Sputum AFB
33	G6PD
34	PT (INR)
35	APTT
36	Bone marrow aspiration morphology
37	HbA1C
38	Coomb's test
39	D-dimer
40	LDH
41	Calcium
42	Phosphate
43	Tumor marker- AFP, CEA, CA 125, CA 19-9, CA 153
44	Thyroid function test- T3, T4, TSH, Free T3, Free T4
45	Troponin T
46	Culture and sensitivity- blood, urine, sputum, throat swab, nasal swab, genital swab, skin swab
47	Gene X pert
48	Biopsy
49	Cytology

Curriculum Vitae

Name	Dr. Thidar Aung
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Publication	-