ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

Assessment of Medical Laboratory request formcompleteness and non-communicated result to clinicians in the two public hospitals found in Hawassa city, Southern Ethiopia.

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Acknowledgment

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List of abbreviations

CBC	Complete blood count
DRERC	Departmental Research and Ethical Review Committee
ETB	Ethiopian birr
GP	general practitioner
HURH	Hawassa University Referral Hospital
ICU	Intensive Care Unit
IPD	Inpatient Department
IRB	Institutional Review Board
LIS	Laboratory Information System
OPD	Out Patient Department
RLS	Resource Limited Settings
SNNPR	Southern Nation's Nationalities and People Region
SPSS	Statistical Package for Social Science
TAT	Turnaround Time
TFT	Thyroid Function Tests

Abstract

Back ground: Long years ago, history and physical examinations have been the most important part of patient's assessment. However, in recent years, the care of patients has become increasingly dependent on the results of laboratory investigations, and clinical laboratories have become a major component in the delivery of health care.Correctly designed and properly completed request forms are vital for the performance of all laboratory tests to the benefit and satisfaction of users.Results that never reach the physician affect the quality of patient care and unnecessarily wastage of financial health resources.

Objective-The objective of this study was to evaluate the content of empty request form to the standard and to assess completeness of filled information on medical laboratory request form and communication of results to users in two public Hospitals of Hawassa city, southern Ethiopia.

Methods– ACross-sectional descriptive study design was employed. We collected all request forms submitted to the laboratory during March 15-30, 2015. Data was collected and information was recorded on the data collection sheet and cheeked for its completeness. To assess non-communicated requested result.we reviewed patient medical record. Furthermore to asses factors contributed to improper completion and failed collection, clinicians were asked using pre structured questionnaire. Finally data were analyzed using SPSS version 16.0.

Result -The content of HURH empty medical laboratory request form to the standard was 16(72.7%) and Adare hospital 9(40.9%) A total of one thousand nine hundred request forms were studied. Our assessment revealed that, none of the request form was completely filled. All of the request forms 100% studied revealed that three or more gaps in the completion of the items assessed. From reviewed requests 23.8% was uncollected and from this 83(33.1%) was CBC.

Conclusion -This study demonstrates that, the standard of completion of request forms was poor. Essential information required on the forms was often missing. This can lead to limited advice given by laboratory personnel and may increase the potential for errors. Conversely, provision of all the information needed on the forms will aid laboratory diagnosis and enhance patient care and save time and resource

1. Introduction

1.1 Back ground

Long years ago, history and physical examinations have been the most important part of patient's assessment [1]. However, in recent years, the care of patients has become increasingly dependent on the results of laboratory investigations, and clinical laboratories have become a major component in the delivery of health care [2].

A clinical laboratory investigation is crucial in diagnosis and treatment of patients [3].Furthermore, modern medical practice is increasingly dependent on reliable clinical laboratory services [4].It has actually been demonstrated that laboratory results influence up to 70% of medical diagnoses [5].

Laboratory quality has been historically determined by the accuracy of the analytical phase. Following the development of high-quality analytical techniques, analytical error is no longer the main reason for error in the laboratory testing process [4]. Up to 68.2% of laboratory errors occur in the pre-analytical phase [6].

Audit has been defined as ‘‘a quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria and the implementation of change’’ [7]. It is a part of continuous quality improvement process and a key element of clinical governance. Laboratory- based audits evaluate components of laboratory services; providing feedback to staff and users of the laboratory [8]. There are three components involved in laboratory auditing, these are: pre-analytical, analytical and post-analytical audit [9].

To reduce the number of errors in the pre-analytical phase and achieve the standards of high quality, special attention must be devoted to this phase. It is a responsibility of the healthcare provider(s) to ensure the completeness of the details of the patient identification and hence this must be done with a great care making it as less error prone as possible. Further, it is also the direct responsibility of the health functionaries to give the complete information about the suspected or confirmed diagnosis in a clear and legible handwriting

and avoid abbreviations as far as possible. This would justify the relevance of the requested tests and also give a clinical impression to the laboratory staff as well as ensure promptness of action Collection of laboratory results and their delivery to the requesting physician is also an essential phase of the clinical laboratory testing process [10].

Laboratory request form is the first line of communication between clinician and laboratory personnel [11]. Furthermore, it provides information about the laboratory test being requested for. They carry demographic data and otherrelevant information such as location of patient, laboratory number, doctor's name, signature of the doctor, telephone number of the requesting doctor, the ward, laboratory number, clinical details, and fasting status of the subject and the date of request. Omission of information on the forms may lead to laboratory errors [12].

Correctly designed and properly completed request forms are essential for the performance of all laboratory tests to the benefit of the patient and the satisfaction of the requesting physician [13]. Multiple tick boxes can encourage excessive and probably inappropriate requesting, simply by offering a list of easily accessible tests that may not have been foremost in the clinician's mind [14].

1.2 Statement of the problem

In the face of currently emerging and re-emerging diseases observed in medicine today, the vital role of laboratory medicine in effective management of diseases is not questionable; Reports shows that laboratory services play a role in as much as 60-70% of decisions related to hospital admission, prescribed medication and discharges. This dependence of patients' management on laboratory data underlines the need for regular assessment of quality indicators that may have a profound effect on accuracy, reliability and usefulness of test results [15].

Errors at any stages of the laboratory can lead to a misdiagnosis, mismanagement and represent a serious hazard for patient health. Automation, databases and computers have greatly simplified many aspects of previously tedious tasks, creating a greater volume of routine work, as well as significantly improving the analytical error rate over time. But the extra-analytical phase (pre-analytical and the post-analytical stage) is still the source of concern as they can lead to unpredictable and unfavorable impact on the well-being of patients. In the absence of information regarding type of sample collected, bloody pleural aspirate or cerebrospinal fluid can easily be taken for blood by the laboratory staff, resulting in the use of inappropriate diagnostic technique, reference ranges and ultimately misleading results [16].

Quality and accountability are the focus of current concern in laboratory medicine. Mounting evidence indicates that reliability cannot be achieved in a clinical laboratory through the mere promotion of accuracy in the analytical phase of the testing process. Laboratories have long realized the importance of monitoring all steps in laboratory testing to detect and correct defects. However, most of their attention has been directed toward detecting and correcting defects in the analytical portion of the testing process, such that analytical mistakes now account for <10% of all mistakes [6].

Illegibility, inexact orders, and inappropriate or dangerous abbreviations are not only quality concerns; they are also patient safety issues[17].Increased work load on the laboratory personnel is worsened by incomplete laboratory forms provided by the clinicians leading to rise in the rate of pre-analytical errors. Study reports that incorrect or incomplete data provided to the laboratory could significantly affect the quality and

outcome of overall treatment [5]. Incorrectly completed laboratory request forms are a common problem that compromises patient's management and safety, and often lead to increased workload for laboratory staff. [16].Study states that pre-analytical errors in completing request forms may lead to incorrect interpretation and poor patient diagnosis and treatment [18].

Another major factor is lack of adequate training in ordering laboratory tests by the physicians that may lead to improper completion and their use for non-targeted purposes [19]. These further lead to misdiagnoses and improper medication use which may lead to wasted resources due to inappropriate treatment.As we all know The annual per capita health expenditure in low- and middle-income countries around the world may be as little as $10–$20 compared to $5300 in the United States [20].

Several studies have shown that most laboratory request forms sent to the laboratory are void of detailed information, which is a key to proper processing of samples [5, 21]. This trend has led to misidentification of clinical samples, difficulty in choice of antibiotics to use on clinical isolates, and interpretation of test results among many others. Valuable work time is often lost seeking for essential patient information by laboratory personnel leading to lack of productivity. There are no doubt about the negative impacts of misidentification and misdiagnosis on the general management of the patient [22].

Studies reveal that many errors are made in filling out histopathology requests, such as negligence in completing items, faulty or incomplete information, poor or illegible handwriting, and loss of biological material, mixed-up test results [23]. From laboratories participating in a pathology accreditation program 5% of the forms were incorrectly completed as a result compromising the final diagnosis. These authors concluded that if such errors (although relatively few in number) could occur in laboratories with rigorous quality control standards, it was entirely possible that the number of errors would be greater in other less demanding laboratories. Neglecting to provide detailed clinical information is largely responsible for medical malpractice claims involving pathologists. Periodic assessments by the College of American Pathologists revealed that 10% of specimens submitted to pathology were not even accompanied by request forms [24].

According to Price, 'any test will be beneficial only if appropriate action is taken on the results'. [25]. Assessing Laboratory errors are important because laboratory data influence 70% of medical diagnoses and can significantly influence the success and cost of patient treatment[26]. Misuse of laboratory services through inappropriate laboratory test requesting is in question worldwide because of its impact on total costs, and the inherent increased risk of medical errors and injury[27].

It is important to go outside the laboratory to identify the common errors made in laboratory process [28]. Laboratory tests cost the health care system large amounts of money and their inappropriate use may be associated with other inefficiencies in health care delivery. Identifying inadequacies in the use of laboratory services may disclose problems in other areas of health care [29].Although laboratory tests are useful and important, it can only add value if correctly applied or used in a rational manner [30].In a study conducted in New York, Results that never reach the physician affect the quality of patient care and unnecessarily wastage of financial health resources. The total cost for uncollected tests was 30% of the average monthly laboratory budget. This indicates that significant amount of the laboratory budget is wasted on laboratory test reports that are never collected from the laboratory [31].

Laboratory quality systems are critical to the success of any laboratory service. The most important prerequisite for the establishment of an effective laboratory quality system is to create and/or adopt medical laboratory standards and regulations specific for each country's unique setting. Currently, some countries follow international laboratory standards but the degree to which government laboratories adhere to these guidelines is not assessed[32].

.There is no research done concerning assessment of proper use of essential information on request form in this study area .Therefore, this study aims to assess the conformity of empty laboratory request form to the standard the laboratory request form completeness, proportion of non-communicated result to clinicians and factors contributing to incompleteness of laboratory request form and non-communicated result to users in the two governmental hospitals found in Hawassa city. This will point out the problems in this regard and I believe it gives some information for further improvement in quality of

completion of laboratory request form, quality of generated data, collection of laboratory report and rational laboratory ordering.

2. Significance of the study

Evaluating the quality of empty request form to the standard looking its completeness and assessing proportion and type of non-communicated result can have significant importance in avoiding misdiagnosis of any laboratory order, wrong patient identification, misidentification of clinical samples, difficulty in choice of antibiotics to use on clinical isolates and minimize work load. In addition, it helps in interpretation of test results among many others and avoids threat to patient safety and poor quality of laboratory services and identifies area of improvement for better and effective completion of laboratory request form. Furthermore timely collection of laboratory report and help in rational laboratory ordering by clinician after knowing the proportion of uncollected laboratory report in the area.

There are guide lines which states how to fill and what parameters should be included in the hospital's laboratory request form [33,34]. But there is no control mechanism to assess completion of request form submitted to the laboratory. This problem is further compounded by the unavailability of studies to inform the real status of the quality of the information completeness of laboratory request form and proportion and type of uncollected report in this area. Therefore, this study is aimed to fill the gap on assessing the essential information completeness on laboratory request form and the proportion and type of uncollected report. Furthermore, the findings will help for clinicians and laboratory personnel to improve information completion of laboratory request form, rational requesting of laboratory tests by clinicians and timely collection of laboratory report in order to treat patients properly, safely and timely.

3. Literature review

Several authors studied evaluation of laboratory request form information in completeness and some of them studied proportion of uncollected report.

A retrospective observational study conducted in New York states that the laboratory issued 22,445 patient reports with more than 150,000 biochemistry analyses. Of these, 464 (2.1%) were uncollected laboratory reports. When compared to the representative period, patients who never collected their laboratory reports were younger (p-0.001) or suffering from some chronic disease. Routine biochemistry tests were the most prevalent (50%). The majority of routine biochemistry tests were almost equally represented during the study and representative period, while molecular diagnostic tests were several times more frequently uncollected (p-0.001).Reports with electrolytes, metabolites and glucose were the least likely to be uncollected (p-0.001). The total cost for those tests was 30% of the average monthly laboratory budget [4].

Another study conducted in Rio de Janeiro, Brazil, states that Of the 12,000 biopsies performed in the two laboratories on 647 request papers showed that diagnostic hypothesis and clinical data were completed correctly in 28.7% and 65.22% of the forms respectively. And the other item resulted as follows, sex 89.5%, age 89.6%, name 97.2%, requesting institution 97.2%, requesting physician 98%, date of delivery of material 99.0%, and signature of the physician who prepared the report was 99.5% [32].

According to a cross-sectional descriptive study conducted in Pakistan, Rawalpindi; Out of a total of 1000 forms studied, none was completely filled. Clinical note has been present in only, 2.4% and 13% of the forms. sixty two percent of the expensive investigations were requested by specialists while 38% were ordered by residents and general practitioners but the percentage of avoidable expensive tests ordered by the general practitioners and residents was significantly higher than the specialists($p<0.001$). A total of (40%) and (22%) diagnostic test reports were not collected from the Chemical pathology and Hematology departments respectively [35].

In another study conducted in Pakistan, total number of uncollected tests reviewed in the audit was 1972 total number of tests requested by Ob/Gyni department including Emergency labor room were 56.2%. Out of this majority of tests included complete blood count (CBC)-36.9% and blood sugar level (BSL) 13.6% total number of tests requested by all other Departments of the hospital were 40.5%. Approximate cost of these uncollected tests if done in a private sector, works out to be approximately 576700 Pakistani Rupee. [36].

In a similar prospective study conducted in North India to screen the lab request forms has revealed that, the name of the patient was recorded in all the forms whereas their age was not mentioned in 1.41%, sex of patients was not mentioned in 1.32% and the registration number was missing in 0.99% of the patients. The details pertaining to whether the patient had been registered at the OPD, Ward, ICU or Emergency was missing in 3.6% of the forms. The treating physician's names were missing in13.1% of the forms and these were not signed by them in nearly 13.4%.Clinical details were illegible or difficult to decipher in 89.25% of the lab request forms. The diagnosis was not mentioned in 61.2% of the patients. Diagnosis was mentioned in abbreviated forms in nearly 1.98%. Of these abbreviated diagnosis nearly 6.6% were not standard abbreviations. The type of the specimen was not mentioned in 61.6% forms, date of collection of the specimen was missing in 13% [10].

According to a retrospective collaborative study conducted in South Africa, 482 request forms for TFTs were received. The worst parameter completed by requesting clinicians was that of medication details; 74.5% of the forms lacked this parameter; 65.2% had no contact details for the clinician; 20.8% had no diagnosis, and 25.3% had a diagnosis but in an abbreviated form. Patient and clinical details were relatively well filled in, but this might have been due to most forms being pre-stamped with clinic details, and patient identification stickers are often used. The type of specimen collected was not stated on 3.3% of forms; 7.5% did not state the date and 36.3% did not state the time of collection [18].

In another study from South Africa, A total of 2550 request forms were analyzed. Medication(s) used by the patient (89.6%) and doctor's contact number (61.2%) were the

most incomplete parameters. No diagnosis was provided on 19.1% of forms, and when a diagnosis was present it was an abbreviated form in 37.3%. This resulted in 35.5% of diagnoses not being recorded by reception staff. Incomplete ward information was found on 4.9% of forms. In a separate search, the impact of 151 request forms (collected over a period of eight months), with incomplete ward location information and corresponding to critical results was assessed. Critical results were not communicated by telephone to clinicians in 19.9% of cases [5].

A study was conducted in Ghana to evaluate the completeness of information supplied on the request form. Out of all the required information only the patient's name and the laboratory test being ordered were present on all 3,000 forms. The patient's age was not supplied on 25.6% forms, while patient's gender was present on 67.3% of forms. The location of the patient was missing on 47.8% forms. Only 77.3 % of the request forms evaluated contained the clinical details of the patient. With respect to physician information; the name of the physician ordering the test was provided on 55.4% of forms, while 75.7% were signed by the doctor. The date the test was ordered was present on 62.7% of forms .None of the 3,000 request forms had the requesting physician's telephone / fax number or the time the specimen was collected [12].

Another study was conducted in Nigeria, to determine type and frequency of omission of relevant data on laboratory request forms. Data mostly omitted was patient's age, observed in 48.3% of request forms reviewed. Complete documentation was only observed in respect to patients name and signature of attending physician. The name of the attending physician, however, was missing in 19.8% of forms audited. Information regarding patient's gender and location (ward) in the hospital was absent in 1.1%, and 20.1% cases respectively. Sixty point four percent of audited forms were void of working diagnosis, while type of clinical sample was not documented in 2.7% of laboratory request forms evaluated [16].

Another study conducted in Lagos, Nigeria has tried to assesses pre and post education completion performance on 527 laboratory request forms this study has shown that the

name was completed in 100%in pre and post as well, age was 78% in pre and 97% in post, sex was completed 95% in pre and 99% in post ,hospital no was filled in only 42% in pre and 67% in post, ward was filled in 81% in pre and 85%in post ,clinical diagnosis was filled in 82% in pre and 99% in post, type of specimen was completed in 88%in pre and 93% in post[11].

On a retrospective study conducted in Nigeria, Lagos. A total of 1441 cases were reviewed. The ages were accurately filled in only 9.5%. The duration of hospital stay was not indicated in 95.2% of cases. Column for clinical summary was not filled in 56.3% cases. The working diagnosis was confusing to the Laboratory Physicians in 14.1% cases and non-informative in 18.4%. A total of 31.5% specimens were inappropriate for the requested investigations and investigations not relevant to the working diagnoses in 36.8 % cases [37].

4. Objective

4.1-General objective

The general objective of this study was to evaluate the content of empty request form to the standard and to assess completeness of filled information on medical laboratory request form and communication of results to users in public Hospitals ofHawassa city, southern Ethiopia.

4.2. Specific objective

The specific objectives of this study was

- To evaluate the content of empty medical laboratory request form to the standard
- To determine the type and frequency of omitted information
- To assess the proportion and type of non-communicated report
- To identify factors contributed to incomplete laboratory request form and failed collection of the laboratory request form by clinicians.

5. Methodology

5.1. Study design and study area

A cross-sectional descriptive study design was employed in Hawassa referral and Adare hospitals from March 15 to 30, 2015. All the request papers submitted to the laboratories of Hawassa referral hospital and Adare hospitals laboratory was collected to evaluate its information completeness. Furthermore patient medical record review was done to assess the proportion and type of uncollected reports. Hawassa is the capital city of Southern Nation's Nationalities and People region (SNNPR) located at 275km from Addis Ababa, Ethiopia. The altitude of the town is 1697m above the sea level with mean Annual temperature of 20.9^0Cand 997.6mm of rainfall. According to 2007census, the total population of Hawassa town was 258,808 with almost 1:1 male to female ratio.

Hawassa city administration has two governmental hospitals named Hawassa Referral Hospital and Adare Hospital. Both hospitals have different outpatient and inpatient department working in collaboration with medical laboratory department. Hawassa University Referral Hospital started giving service in November 2005, previously the establishment and building of the hospital was initiated by the southern nation nationalities and people's regional government. Then after it was given to the University of Hawassa intending for the purpose of training health professionals. The hospital has 350 beds for admitted patients. It is expected to serve 10 million peoples of the southern region and the surrounding Oromiya zones. The hospital has an objective of providing health services, training different health professionals and conducting research pertinent to health. Furthermore, it has a mission to give standardized quality service with disciplined professional ethics without any compliant from the service seekers. The laboratory department of Hawassa referral hospital has five sub units: central laboratory, medical OPD laboratory, IPD laboratory, gynecology and pediatrics OPD laboratory and emergency laboratory. The entire department in the hospital works their activities in collaboration. They use laboratory request form prepared by the hospital to communicate with physicians in charge of the Patient. 1088 request papers were submitted to all sub-units of the laboratories per 10 working days and 218 request forms were submitted to all

laboratories at week end time and totally 1306 clinical laboratory request forms were assessed.

Adare hospital is a district hospital which is up graded from health center in 2004 EC and it has limited health professionals and hospital setting. The laboratory department of this hospital works its activity in centralized manner. They received 594 laboratory request form in 15 days of the study period they also use laboratory request form prepared by the hospital to communicate with physician.

5.2 Source population

All request forms and medical record of patient in Hawassa Referral and Adare Hospitals and all clinicians who were working in public hospitals of Hawassa city from March 15-30, 2015.

5.3. Study population

Laboratory Request forms and patient medical record which were generated from patient who were visiting Hawassa Referral and Adare Hospital's laboratory during the study period and all clinicians who were requesting laboratory investigation from March 15-30, 2015.

5.4. Sample size

All the request forms submitted to the laboratories of both hospitals and all medical record of patients who were visiting the laboratory during the study period.

5.5. Inclusion and exclusion criteria

5.5.1. Inclusion criteria

All the request forms submitted to the laboratories of both hospitals and all medical record of patients who were visiting the laboratory during the study period were included in the study.

5.5.2. Exclusion criteria

Medical records of patients that were not requested laboratory investigations or requested laboratory investigations but not done for some reasons were excluded from the study.

5.6. Study variable

5.6.1-Dependent variables

- Thecompleteness offilled information on laboratory request form
- Type and Proportion of the non-communicated report
- Conformity of empty laboratory request form to the standard

5.6.2-Independentvariable

- Work experience
- Attitude towards the laboratory service
- Educational level of the clinician.
- Clinicians who have taken some clinical laboratory course in university stay
- Presence of all items found in the standard

5.7. Data collection process

5.7.1- Data collection processes for information completeness

Permission to assess patient files was obtained, and data were collected with the assistance of data collectors. The information was recorded on the data collection sheet after orientation was given for data collectors. In the data collection sheet there were different categories which state all the required information like patient information, clinician information, and specimen information. After the request paper was received to the laboratory and regular sample collection was completed data collectors were received the request form and recorded all the required and available information on the request form to data collection sheet. The collection was made by tallying the numbers on the specific space provided. Subsequently, the data collectors were received the laboratory request form again and recorded all available information of the laboratory request form on the

data collection sheet before it leaves the laboratory. Data collection process was continued until we reach the last date of our data collection.

5.7.2-Data collection process for non - communicated laboratory report

For assessment of non-communicated report, first Permission to assess patient files was obtained, then all medical record of patient who were visiting the laboratory during the study period were reviewed to check weather all the laboratory reports were delivered to the requesting physician or not . This was done by checking whether the report was recorded or attached on the patient medical record or not .If the result was recorded or attached in the patient medical record the laboratory report is considered collected. For the patient that laboratory report was not recorded on the patient medical record we crosschecked it with laboratory data saved on the electronic LIS for report from HURH. However for data from Adare hospital the data was cross checked with the data registered on laboratory log book to confirm whether the laboratory test was done or not. If not done the study variable was excluded from the study. Since some laboratory tests are ordered by the clinician and may not be done for some reason. For instance temporary unavailability of some equipment, reagent, shortage of money paying for the laboratory service by patients etc. then Total number of tests performed at HURH and Adare hospital's laboratory during the study period and number of uncollected reports was noted, then, the proportion and type of uncollected data was calculated using this information.

5.7.3. Data collection process for factors contributes to incomplete laboratory request form and failed collection of laboratory report.

For assessment of factors contributes to incomplete laboratory request form and failed collection of laboratory report, We collected information using pre structured questionnaires from clinicians who were working at HURH and Adare hospitals during the study period.

5.7.4- Data collection process for conformity of the empty laboratoryRequest formsdesign to the standard.

We compared each item found in the standard with the items found in the actual laboratory request forms of the study hospitals then the contents found in empty request form were compared with the standard. Then data was calculated using this information.

5.7.5. Questionnaire

A structured questionnaire including information of the participating facilities and clinicians was self-administered. The questioners had sub-components like: clinician information, educational back ground and service, clinician's attitude towards the laboratory service and extent of laboratory utilization, clinician's attitude and practice towards laboratory request form completion [filling], information concerning curriculum and some pre service orientation. Then the Questionnaire was pre tested on 5% of the participants and the pre tested one' s was excluded from the study.

5.8. Sampling method

Convenient sampling method was used to collect information from the participating hospitals from Mar15to 30, 2015.

5.9. Data management and quality assurance

All consecutive laboratory request forms and patient medical records during the study period was collected to avoid bias, proper transcription of data to data collection sheet (check list) was maintained to avoid transcriptions error, and proper data collector's orientation was given to avoid improper data collection. Moreover intensive supervision of data collectors during data collection and pre testing of the questionnaires was implemented.

5.10. Statistical analysis

Data were entered and analyzed using SPSS for windows version 16.0. Nominal /categorical data was described in number and percentage. Data were presented in tables and figures. The presence of relation between outcome and some independent variables was tested using logistic regression. The level of significance was set at p-value < 0.05.

5.11. Ethical consideration

The study was approved by the departmental research and ethical review committee (DRERC) of medical laboratory technology, college of health science, Addis Ababa University. Official letters was written to the participating facilities and HURH and Adare hospitals to get permission. Data capturing format was anonymous we used our own

identification number. A consent form was prepared in English to be read and Sign (if agreed) by the participating clinicians. Information obtained about the clinician from the questionnaires and data capturing formats was totally kept anonymous. Participants had the right not to participate or withdraw from the study any time whenever they want.

Operational definition

Non-communicated result: Laboratory results that were not reach the requesting clinician until the patient management is finished and the cared returned back to card room.

6. RESULTS

6.1-Conformity of the content of empty medical laboratory request form to the standard

Correctly designed and properly completed request forms are essential for the performance of all laboratory tests to the benefit and satisfaction of users. The standard contains 22 item, the content of the study hospitals request was compared against this standard and the result was found to be HURH empty medical laboratory request form was found to contains 16(72.7%) items against the standard and Adare hospital's form was found to contain 9(40.9%) against the standard (Figure 6.1)

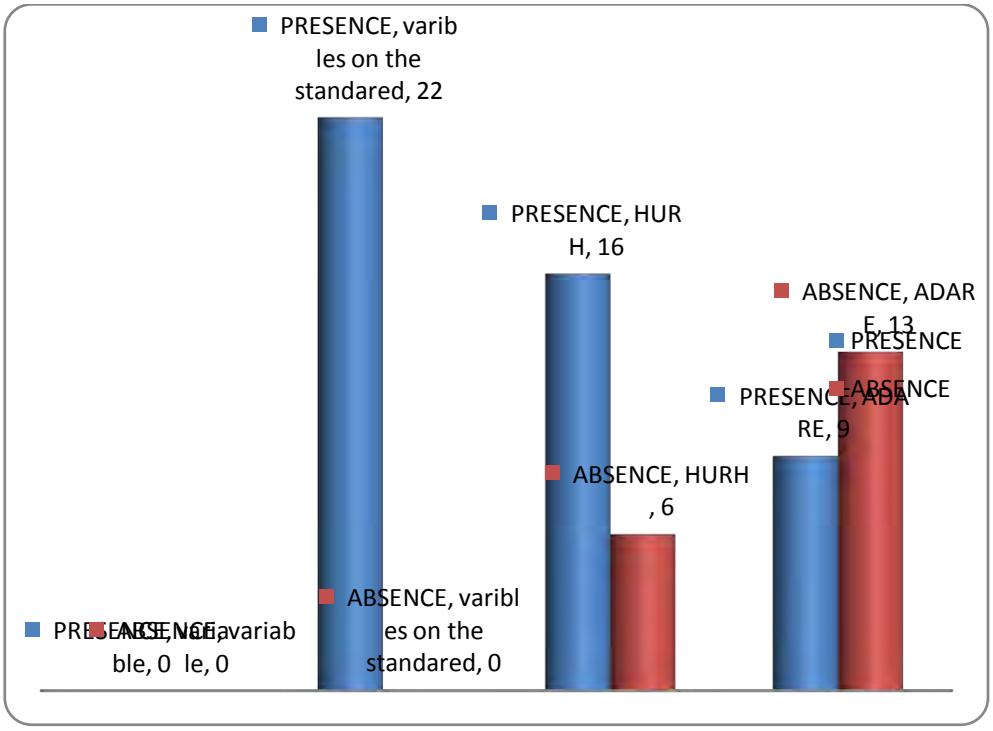

Figure 1-Comformity of the study hospitals empty medical laboratory request form to the standard in the two public hospitals found in Hawassa city, southern Ethiopia, Mar 15-30, 2015.

6.2-Patient, specimen and Clinician information in the laboratory request form

A total of one thousand nine hundred request forms were studied. From this 1306(68.7%) laboratory request form was from Hawassa University Referral hospital and 594(31.3%) were from Adare hospital. Our assessment revealed that, none of the request form was completely filled. All (100%) of the request forms studied revealed three or more gaps in the completion of the items assessed. Name and laboratory investigation were the only parameter filled 100% in both hospitals. Concerning other demographic details such as age and gender, the patient's age was supplied on 1276 (97.7%) of the form of Hawassa University Referral hospital and 553(93.1%) of Adare hospital's form. patient's gender was present on 1282(98.2%) of the forms of HURH and 554(93.3%) 0f Adare hospital's form (Table 6.1).

Table 6.1 - patient, specimen and clinician information filled by ordering clinician in the two public hospitals found in Hawassa city, southern Ethiopia, Mar 15 - 30, 2015.

VARIABLES	HURH= (1306) N (%)	ADARE HOSPITAL (594) N (%)
Name	1306 (100)	594 (100)
Age	1276 (97.7)	553 (93.1)
Sex	1282 (98.2)	554 (93.3)
Pts card no	1161 (88.9)	167 (28.1)
Pts address	14 (1.1)	10 (1.7)
clinical dx	35 (2.7)	NA
Abbreviated clinical dx	20(57.2)	NA
specimen type	70 (5.4)	NA
Lab tests being ordered	1306 (100)	594 (100)
Clinician name	51 (3.9)	NA
Clinician signature	55 (4.2)	NA
Date of request	1218 (93.3)	580 (97.6)

dx, diagnosis; pts, patients; HURH, Hawassa University referral hospital; NA, not available on the form

6.3- Laboratory personnel information

With respect to laboratory personnel information; name of reporting personnel, name of verifying personnel, date of report, date of verification and laboratory personnel comment were not provided in all the request form of Hawassa university referral hospital but in Adare hospitals request form 58(9.8%) of request form was provided with name and signature of the reporting personnel (Table 6.2).

Table 6.2 -Laboratory personnel information on the request form of the two public hospitals found in Hawassa city, Southern Ethiopia, Mar 15-30, 2015.

Variable	HURH= 1306 No (%)	Adare Hospital=594 No (%)
Name of lab personnel (sample done by)	0 (0.0)	58 (9.8)
Signature of lab personnel	0 (0.0)	58 (9.8)
Name of lab personnel who approved the result (result verified by)	0(0.0)	NA
Signature of lab personnel who approved the result		
Date of lab result reporting	0 (0.0)	NA
Date of lab result verification	0 (0.0)	NA
Comment of lab technician	0 (0.0)	NA

6.4- Classification of the request paper completion based on their content

Request form which contains all the variables assessed were 0(0%) in both hospitals, request form which has at least one variables missed were 19000(100%) in each hospital, request form which missed less than four variables were 0(0%) in HURH and Adare hospital were143 (24.4%)(Figure6.2).

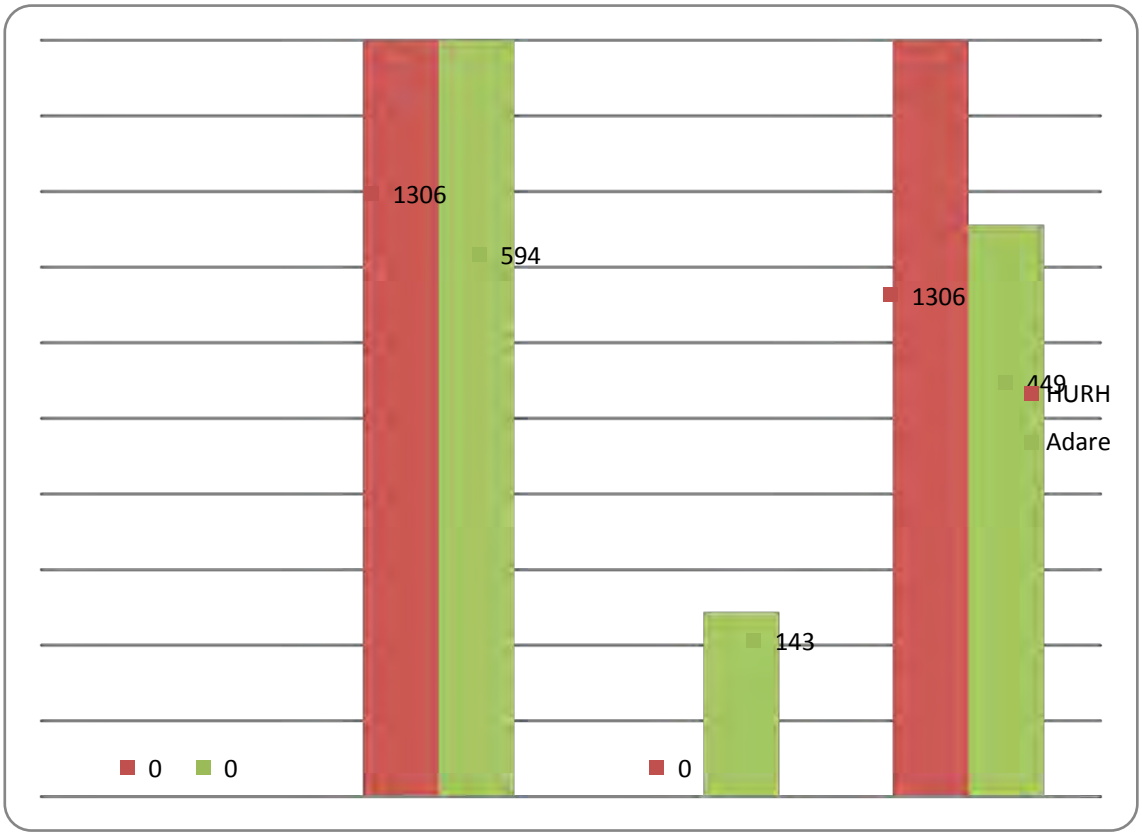

Figure 2 – Classification of incomplete request forms based on their content in the two governmental hospitals found in Hawassa city, southern Ethiopia, Mar 15-30, 2015.

6.5- Proportion of uncollected reports to all request form reviewed

There was 1010 patient medical record reviewed. A total of 1066 request forms were observed from this 251 (23.5%) was non-communicated report (Figure 6.3).

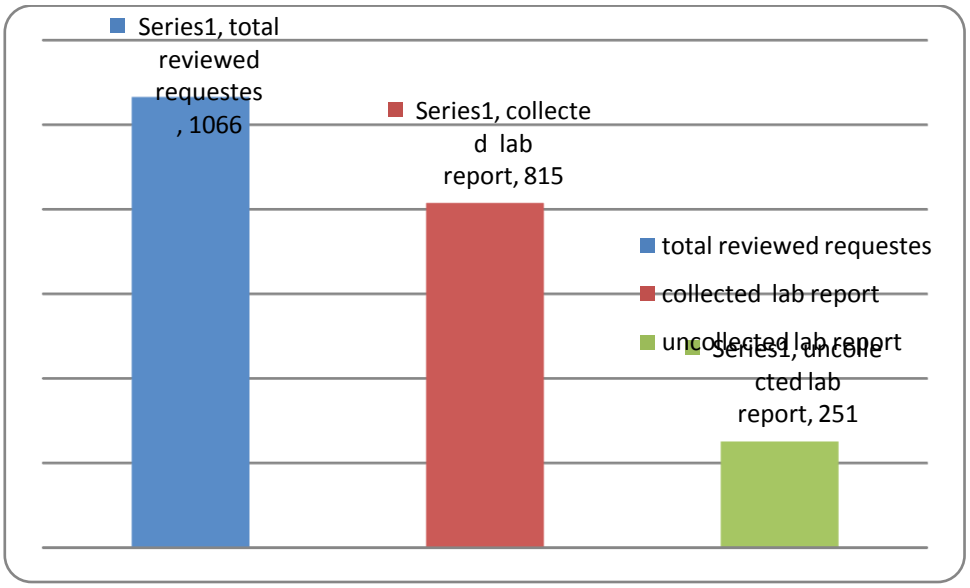

Fig 6.3-Proportion of non-communicated report to the total request form reviewed in the two governmental hospitals found in Hawassa city, Southern Ethiopia,Mar 15-30, 2015.

6.6- Classification of uncollected laboratory report based on test type

Of 251 uncollected request, 83(33.1%) was CBC and 47(18.7%) was CBC with blood group. Twenty four (9.6 %) of uncollected report was urine analysis (Table 6.3).

Table 6.3 - Classification of uncollected laboratory reports based on test type in the two governmental hospitals found in Hawassa city, southern Ethiopia, 15-30, 2015.

Variable	Frequency	Percentage
Only CBC	83	33.1
CBC with blood group	47	18.7
Urine analysis	24	9.6
ESR	18	7.2
STOOL	13	5.2
CBC with ESR	12	4.8
RBS	10	3.98
ESR with urine analysis	2	0.8
ESR with stool	2	0.8
OTHERS	40	15.93
Total	251	100

Total, more than two laboratory investigations together

6.7- Socio demographic characteristics of clinicians who were ordering laboratory investigations.

The mean age of the participant clinicians was 27 years and more than two third 72(77.4%) of participants were male. Among the participants, 39(41.9%) had less than one year of experience which is followed by experience more than two years which accounts 28(30.1%). Fourty six percent of the participants were interns. Both specialists and general practitioner accounted 26.9 % each. Thirty four (36.6%) of the clinician had experience to

work at other organization before they joined the respective institution .The majority of them had experience in governmental organization (Table6. 4).

Table 6.4 - Socio-demographic characteristics of clinicians who were ordering laboratory investigations in study period in the two governmental hospitals found in Hawassa city, southern Ethiopia, Mar 15-30, 2015.

Variable	Number	%
Age in years		
20-30	78	83.9
31-40	12	12.9
>40	3	3.2
Sex		
Male	72	77.4
Female	21	22.6
Total	93	100
Educational level		
Intern	43	46.2
General practitioner	25	26.9
Specialists	25	26.9
Work experience		
< 1 year	39	41.9
1-2years	26	28.0
>2 years	28	30.1
Hired in another organization Before		
Yes	34	36.6
No	59	63.4
Where were you working		
Governmental health center	2	5.9
Governmental hospital	28	82.4
NGO	2	5.9
Private clinic/hospital	2	5.9

NGO,non-governmental organization

6.8 - **Clinician's attitude towards laboratory service and extent of laboratory Utilization**

When clinicians were asked about their attitude towards the general laboratory service 62(66.7 %) stated that it's crucial followed by 29(31.2%) which said important most of the time. Furthermore when clinicians inquired their attitude about their hospital laboratory service 37(39.8%) stated that their attitude is positive and 60(64.5%) of the participants said thatthey underutilized the laboratory. Fourty one (68.3%) More than sixty eight percent of the physician stated that unavailability of laboratory service was a reason for their under utilization (Table 6.5).

Table 6.5-Clinician's attitude towards laboratory service and extent of laboratory utilization in the two public hospitals found in Hawassa city, Southern Ethiopia, Mar 15-30, 2015.

Clinicians attitude about importance Of laboratory service in general		
Crucial	62	66.7
Important most of the time	29	31.2
Important some times	2	2.2
clinician attitude towards their hospital laboratory service		
Negative	22	23.7
Positive	37	39.8
Neutral	34	36.6
Clinician's laboratory utilization		
Over utilization	6	6.5
Proper utilization	27	29
Under utilization	60	64.5
Reason for over utilization		
Payment free laboratory service	1	16.7
Fear of uncertainty	4	66.7
Unaware about the cost of lab test	1	16.
Reason for under utilization		
Luck of confidence on laboratory service	11	18.3
Unavailability of laboratory service	41	68.3
Longer laboratory report issue time	8	13.3
Why do you order laboratory investigation		
To confirm clinical impression and for prognosis	86	92.5
To reassure patient	1	1.1
To do complete work up	6	6.5

6.9 - Clinician's attitude and practice of laboratory request form completion [filling]

When physicians were askedabout the importance of writing clinical diagnosis on the laboratory request forms 40(43%) agreed that it is necessary in all cases while 42(45.2%) said thatit is necessary but not in every case and 11.8% said that it is not necessary. Fourty two (45.2%) of the physiciansclaimed that they wrote clinical diagnosis most of the time while 51(54.8%) negated writing clinical diagnosis. About 74 (79.6%) of clinicians agreed that writing all information on request form is important however, only 32(34.4%) of clinician stated that they wrote all information on request form. when inquired about the reasons for not writing all the information 35(57.3%) of the clinicians said it is due to the increased workload (Table 6.6).

Table 6.6: Clinician's attitude and practice of laboratory request form completion in the two governmental hospitals found in Hawassa city, Southern Ethiopia, Mar 15-30, 2015.

VARIABLE	Frequency	%
Importance of writing clinical d_x		
Necessary in all case	40	43
Necessary but not in every case	42	45.2
Not necessary	11	11.8
Experience of writing clinical d_x		
Yes	42	45.2
No	51	54.8
Importance of filling all information		
Yes	74	79.6
No	19	20.4
Experience of writing all information on the request		
Yes	32	34.4
No	61	65.6
Reason of unable to write all information		
Increased work load	35	57.4
I don't think it is important	19	31.1
Since I haven't seen such a trend of filling	7	11.5
Taken some clinical laboratory course		
Yes	44	47.3
No	49	52.7
Importance of including some clinical laboratory course in the curriculum		
Yes	89	95.7
No	4	4.3
ever got some orientation or a kind of in service training		

Yes	9	9.7
No	84	90.3
Importance of lab orientation for newly employed clinician		
Yes	77	82.8
No	16	17.2
Experience of collection of all laboratory investigation report		
Yes	69	74.2
No	24	25.8
Reason for not collected the laboratory report		
I am not confident with laboratory service	4	16.7
I sent it to reassure p't so I don't need it	2	8.3
Long stay time to receive the lab result	18	75
Awareness about the cost of each laboratory test		
Yes	23	24.7
No	70	75.3

P't , patient $d_{x,\ diagnosis}$

6.10. Associations of clinician's clinical laboratory request form completion and extent of laboratory report collection with some selected independent variables

In multivariable logistic regression analysis adjusted for work experience, educational level and taken some clinical lab course, clinicians who has work experience more than two years (UOR 7.707,95%CI 2.398,24.772,P value< 0.001) and being general practitioner(UOR5.692,95%CI 1.774-18.268 Value 0.003) were found to be significantly associated with proper clinical diagnosis writing.Those who taken some laboratory course (UOR 29.644, 95% CI 7.889-111.399,P value <0.001) had significant association with writing all information .In univariable logistic regression those who has educational level general practitioner (AOR 0.006,95% CI 0.001,0.065 P value < 0.001) and those who didn't take some laboratory course(AOR 32.22,95%CI 7.640-135.844 P value <0.001)were found to be significantly associated with proper request form completion (Table 6.7).

Table 6.7- Associations of completeness of request form and utilization of laboratory result by clinician with some selected independent variables in the two public hospitals found in Hawassa city, southern Ethiopia, Mar 15-30, 2015.

outcome variable	Explanatory	unadjusted OR	95%CI	P value	adjusted OR	95%CI	P value
proper clinical diagnosis writing	**work experience**						
	< 1 year	1.000			1.000		
	1-2 years	1.889	(0.670-5.323)	0.229	0.613	(0.142-2.653)	0.513
	> 2 years	7.707	(2.398-24.772)	0.001	0.804	(0.145-4.445)	0.802
	Educational level						
	Intern	1.000			1.000		
	general practitioner	5.692	(1.774-18.268)	0.003	0.006	(0.001-0.065)	<0.001
	specialist	148,000		<0.001	0.033	(0.003-0.320)	0.003
	Taken some laboratory course in university						
	Yes	1.000			1.000		
	No	0.578	(0.253-1.319)	0.193	1.216	(0.370-3.996)	0.747
proper writing of all the information on request	**work experience**						
	< 1 year	1.000			1.000		
	1-2 years	0.441	(0.157-1.240)	0.121	0.399	(0.078-2.038)	0.270
	>2 years	1.176	(0.385-3.598)	0.776	1.269	(0.201-8.007)	0.800

	Educational level						
	Intern	1.000			1.000		
	general practitioner	0.170	(0.058-0.502)	0.001	0.241	(0.055-1.066)	0.060
	specialist	0.960	(0.301-3.058)	0.944	2.095	(0.329-13.346)	0.434
	Taken some laboratory course in university						
	Yes	1.000			1.000		
	No	29.644	(7.889-111.399)	<0.001	32.216	(7.640-135.844)	< 0.001
Utilization of laboratory result by clinicians	**work experience**						
	< 1 year	1.000			1.000		
	1-2 years	3.548	(1.136-11.077)	0.146	2.614	(0.724-9.439)	0.142
	>2 years	2.392	(0.739-7.738)	0.079	1.022	(0.202-5.168)	0.979
	educational level						
	Intern	1.000			1.000		0.028
	general practitioner	0.287	(0.057-1.134)	0.123	0.371	(0.090-1.533)	0.171
	specialist	3.046	(1.059-8.762)	0.039	0.081	(0.13-0.510)	0.007

	Taken some laboratory course in university						
	Yes				1.000		
	No	0.690	(0.272-1.754)	0.436	1.642	(0.569-4.741)	0.360

7. Discussion

Clinical laboratories have long focused their attention on quality control methods and quality assessment programs in dealing with the analytical aspects of testing. However, most of the evidence accumulated recently showed that quality in clinical laboratories cannot be assumed by focusing on analytic aspects only. Pre and post-analytical processes are equally important for ensuring quality laboratory services. Process analysis has demonstrated that laboratory errors occur primarily in the pre analytic phase, influencing patient outcomes andCost. [4]

Laboratory request form is the first line of communication between clinician and laboratory personnel. Correctly designed and properly completed request forms are essential for the performance of all laboratory tests to the benefit and satisfaction of users. [9,21]. In the present study the conformity of the empty laboratory request form's design to the standard is low .The contents on the standard was 22 item.The contents of HURH laboratory request formwas 16(72.7%)and Adare hospital was 9(40.9%)to the standard.This might be due to lack of standardization of request forms by the medical laboratories which is a crucial step in quality assurance in general.

Our findings showed that a total of one thousand nine hundred request forms were studied. From this 1306(68.7%) of the laboratory request form is from Hawassa University Referral hospitaland 594(31.3%) of the form is from Adare hospital. Our evaluation revealed that, none of the request form was completely filled. Comparable with similar study conducted in Rio de Janeiro, Brazil that 100% of the request forms studied revealed one or more gaps in the completion of the items assessed[32]. In this study clients name and the investigation requested appeared on all the forms evaluated, this is comparable to a similar study conducted in Ghana,the patient's name and the laboratory test being ordered were present on all 3,000 forms [12]. This was not surprising since

it was very likely that the request would have been turned down to requesting clinician, if the required test was not stated and the client's name was absent.

Our study showed that the patient's age was supplied on 1276 (97.7%) of the form of Hawassa University Referral hospital and 553(93.1%) of Adare hospital's form. patient's gender was present on 1282(98.2%) of the forms of HURH and 554(93.3%) of Adare hospital's form. Comparable with similar study conducted in North India age was mentioned in 98.6%, sex of patients was mentioned in 98.7% [10].Higher than studyconducted in Rio de Janeiro, Brazil that sex were provided in 89.5% and age were mentioned in 89.6% studied [32] and highly disagreed with a study conducted in Nigeria, Legose the ages were accurately filled in only 9.5% and sex in 9.3% of the request [11].this is because most client served in both ofour study hospitals was from urban area even those who come from rural area was most of the time accompanied with relative from urban that's why they have more understanding about their age why it makes the completion of age better.

In present study Patient location was provided on 586 (98.7%) of the forms of Adare hospital but no place provided for patient location in HURH laboratory request form when designed. Its highly disagreed with similar study conducted in Ghana, The location of the patient was missing on 1433 (47.8%)of the forms [12]. Since laboratory staffs of Adare Hospital prepared temporary storage place in the laboratorybased on patient location,so to get the result immediately clinicians motivated to write patient location most of the time. The patient's demographic data is relevant because it helps in specimen identification and proper interpretation of results. For instances where samples from different subjects have the same or similar names, information such as the location of the subject, age and gender are important to differentiate and sorting out both the subject and samples. MainlyAge and gender are extremely important considering that the reference ranges for a number of analytes are age and sex dependent. The location/ward of the patient enables critical results to be immediately communicated to the clinician. Dispatch of

patients result from the laboratory to various wards in the hospital may experience some delays by the omission of this important information on request forms and the critical results are unable to communicate as fast as possible.

In the current study MRN was not provided in 145(11.1%) of HURH and 427(71.9%) of Adare hospital's request form it is less when compare with similar study conducted inNorth India that indicates the registration number was appeared to be 99.01% of the form..InAdare Hospitals log book there is no place prepared to register MRN of patient that's why it's not given attention and they are not motivate the clinicians to do so. In HURH they use electronic LIS so to enter the data properly they need to have MRN if not filled the request turned back to the requesting clinician to be filled that's why it showed better completion than Adare hospital. the name of the clinician ordering the investigation were not provided on 1255(96.1%) of HURH forms but there is no place prepared to write the name of the clinician on the request paper of Adare hospital when designed, while 1251(95.8%) of the form were not signed by the clinician's of HURH and there is no place provided for signature of requesting clinicians to sign on the Adare hospitals request paper. This result is highly disagreed with similar study conducted in Rio de Janeiro, Brazil. Which is requesting physician name was provided in 98%, and signature of the physician 99.5%.[32] writing information concerning clinician is important to communicate critical result immediately and it proofs accountability when necessary especially in forensic case but the absence of this put accountability issue in question. In HURH most of the time laboratory investigation is requested by interns and most of them are not concerned with accountability issue and they are not interested to write their name and sign on the request as well.

In the present study the date of request was found on 1218(93.3%) of HURH and 580(97.6%) of Adare hospital's form. Which is higher than similar study conducted in Ghana the date the test ordered was present on 62.7% of forms [12]. This is crucial to get immediate result when needed based on the request date if it is properly provided on the form and recorded properly and

important in case of TAT assessment. Concerning usage of proper request form for ordering in Adare hospital 594(100%) was properly used proper request form and In HURH 1298(99.4%) of the form were properly utilized. Since the request forms are not updated timely when new testes are added the clinicians forced to do it in wrong place but sometimes negligence of clinician also creates this kind of problem and they use wrong request form even if the needed request form is available.

Our study shows that clinical diagnosis was provided only in 35(2.67%) of HURH laboratory request forms and from the clinical diagnosis provided 20(57.1%) is in abbreviated form. but no place for the clinical diagnosis is designed for Adare hospitals request. This is lower than the study conducted in northern India the diagnosis was mentioned in 38.8% of the patients and higher in case of abbreviated form from the Indians which Diagnosis was mentioned in abbreviated forms in nearly 1.98% only[10]. This is because most of the clinicians working at HURH think giving information about clinical diagnosis is necessary but practically it is not applicable but absence of clinical information or misleading information leads to extraneous and unnecessary additional tests which has definite resource management and demand implications but when clinical diagnosis is provided it helps the laboratory personnel to focus on some vital test and in turn it saves time and resource.

In Our study type of specimen was the third most incomplete parameter , provided only in 70(5.4%) of the forms of HURH form and no place designed for specimen type in Adare hospital laboratory request form. which is lower than similar study conducted in northern India, The type of the specimen was mentioned in 38.4% forms[10]. and highly disagreed with similar study conducted in south Africa indicated that The type of specimen collected was not stated only 3.3% of forms and study conducted in Nigeria which was not stated in 2.7% of form assessed[5,11]. In the absence of information regarding type of sample collected, bloody pleural aspirate or cerebrospinal fluid can easily be taken for blood by the laboratory staff, resulting in

the use of inappropriate diagnostic technique, reference ranges and ultimately misleading results. Thetime of collection were the second most incomplete parameters provided which is 1(0.08%) of HURH request form but there was no Place provided in Adare hospital's request form when designed.Which is highly disagreed with similar study conducted in South Africa indicated that 36.3% did not state the time of collection. [5] It has its Owen impact in proper diagnosis and delivery of quality service since time of collection is crucial for samples like CSF which its result is much affected by delay. Missing the time of collection may changes the outcome of the whole process and May results in erroneous patient result.

Our study showed that laboratory personnel information such as name of reporting personnel, name of verifying personnel, date of report, date of verification and laboratory personnel comment were not provided on all the request form of HURH but in Adare hospitals request form 58(9.8%) of request form was provided with name of the reporting personnel and signature and date of report as well. However there is no place for date of verification, verifying personnel signature, name of verifying personnel and laboratory personnel's comment Which is highly disagreed with similar study conducted in Rio de Janeiro, Brazil that states signature of the physician who prepared the report was found to be 99.5%[32].Even if Quality and accountability are the focus of current concern in laboratory medicine [11] in this study it was found to be the most incomplete parameter provided this result put accountability issue in question.In addition harmonization of laboratory request form in the two hospitals is a priority to minimize the loss of information while clinicians are requesting.

In the current study, When physicians were asked about the importance of writing clinical diagnosis on the laboratory request forms, 43% agreed that it is necessary in all cases while 45.2% said that it is necessary but not in every case. And 11.8% said that it is not necessaryWhich is comparable with astudy conducted in Pakistan When physicians were asked, more than 55% agreed that it is necessary in all cases while 45% said that it is necessary but not

in every case. [33] More over in our study 45.2% of the physicians claimed that they wrote clinical diagnosis most of the time while 54.8% negated writing clinical diagnosis. That is highly disagreed with a study conducted in Pakistan 73% of the physicians claimed that they wrote clinical notes most of the time while 18% negated writing clinical diagnosis. [33] When inquired about the reasons for not writing the clinical diagnosis, more than 57%said it is due to the increased workload comparable with a study conducted in Pakistan indicated that 63% said it is due to the increased workload. [33]

Our study showed that from total no of reviewed request 251(23.5%) of test reports were not collected which is much higher than a study conducted in New York which the uncollected report accounts 2.1% [4].Also higher than study conducted in Pakistan stated thatabout 13% of the total reports were not collected. [33] This cause unnecessary wastage of health care resource budgets in addition to increases the workload of already overburdened laboratory staff.Also prevents the introduction of newer and more important tests due to loss of a considerable amount of the laboratory budget on useless investigations not reached to users.

8. Limitation

- A follow-up on how these incorrectly completed request forms and non- communicated result affect our services is desirable, but would be difficult to implement in our setting. This is a possible area for future research.

- Most of the study conducted in this area focused on information's filled by the clinicians and information from the laboratory which is filled by laboratory personnel is not given attention but this area is crucial and this problem made this part not to be compared with related literature and to be discussed in detail.

- Shortage of articles on the topic especially about the uncollected laboratory request form made me not to put related topics separately with the same sub title in the literature review part and made this part not to be discussed in detail.

- Our research didn't include the actual amount of financial impact of non communicated result since it is difficult to perform in our setting. So, it is a possible area for further study.

- We considered results that reach to the requesting clinician is as communicated result but the clinician may not used it for patient management so, this is also possible area for further study.

9. Conclusion

This study demonstrates that the contents of empty request form to the standard is low .furthermore the standard of completion of request forms was poor in the area. Essential information required on the forms was often missing. This can lead to increased TAT, generation of report with poor quality, misdiagnosis of test result that may have negative impact on patient management and may increase the potential for errors. Conversely, provision of all the information needed on the forms will aid laboratory diagnosis and enhance patient care and save time and resources. As laboratory data influences 70% of medical diagnoses, incorrect or incomplete data provided to the laboratory could significantly impact the success and cost of overall treatment. A good insight on error-prone steps in the laboratory process is essential to achieve error reduction; hence, in addition to maintaining quality standards within laboratory, it is important to go outside the laboratory to identify the common errors made in laboratory process and to reorganize the activity of the wards. Incomplete data on laboratory request forms can lead to misdiagnosis and mismanagement of patient. Moreover the rate of non-communicated data was also high in this area there is no doubt it will cause the overall health care resource wastage.

10. Recommendation

- The request forms of each laboratory need to be revised and updated in a limited interval to make them more informative and user friendly.
- The laboratories should be more closely involved in organizing orientation programs for newly employed clinicians.Then the program should clarify the importance of providing all relevant information to the laboratories and the impact when some data missed and wastages caused by non- communicated result.
- We recommend a repeat assessment after six month of orientation, to assess if there has been any improvement in the standard of completion of request forms and proper collection of laboratory report.
- The curriculum of all university should include clinical laboratory methods course to inform Medical students about the laboratory activity in general including request form completion. This will help them to understand the complimentary roles played by clinical and laboratory practice.
- We recommend further assessment of the financial impact and the real states of outcome of the incomplete data of laboratory request form in patient management and health care delivery at all.

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Annex 1-Check list for Data collection format (check list) on study of assessment of medical laboratory request form incompleteness and non- communicated result to clinicians

Name of hospital _____ Number of request form_____

Parameter	G	M	I	S	E	Present	Absent
Age							
Sex							
Card no (MRN)							
Address							
Laboratory investigation being ordered							
Clinical diagnosis							
Use of abbreviation on clinical diagnosis							
Type of specimen							
Time of collection							
Date of request							
Clinicians name							

Clinicians signature							

Date ---------- key -M-for medical OPD

Signature of data collector ---------- G-for gyni and Pedi OPD

I-for all inpatient

S-surgical OPD

E- Emergency laboratory

Check list: Data collection format (check list) of the study on assessment of medical laboratory request form incompleteness and non- communicated result to clinicians

Name of hospital _____ Number of request form _____

Parameter	G	M	I	S	E	Present	Absent
Standard reporting system							
Writing reference ranges							
Signature of reporting personnel							
Date of report							

Signature of verifying personnel							
Date of verification							
Proper documentation before living the lab							

Date ---------- key -M-for medical OPD

Signature of data collector ---------- G-for gyni and Pedi OPD

I-for all inpatient

S-surgical OPD

E- Emergency laboratory

Check list: Data collection format (check list) for card review on study of assessment of medical laboratory request form incompleteness and non- communicated result to clinicians in the two governmental hospitals found in Hawassa city, southern Ethiopia,

Name of hospital _____ number of medical recorded reviewed_____

Number of request in reviewed medical recorded _____

Number of non-communicated result	Type of non-communicated result	Remark

Name and signature of data collector _____

Annex 2: Questionnaire

The information is collected by principal investigator. It will be collected from Mar15-30, 2015

Instruction:<u>Encircle on the appropriate choice on the response category</u>

Code	Question	Response category	Remark
Part one: socio-demographic information			
101	Age in years	_____	
102	Sex	1. Male 2. Female	
103	Work experience	1. Less than one year 2. 1-2 years 3. More than two years	
104	What is your professional status?	1. Intern 2. General practitioner 3. Specialist 4. Others ,specify_____	
105	Have you ever haired in another health facility?	1. Yes 2. No	
106	If your response is yes for Q105: Where were you working?	1. Government Health Center 2. Government Hospital 3. NGO 4. Private clinic/Hospital 5. Other (specify)_____	
Part two: clinician's attitude towards the laboratory service and extent of laboratory utilization.			
107	What do you think about the importance of laboratory service as a whole?	1. crucial 2. important most of the time 3. important some times	

		4. did not contribute to patient management	
108	What is your attitude towards your hospital laboratory service?	1. negative 2. positive 3. Neutral	
109	What do you think of your laboratory utilization?	1. Over utilized 2. Properly utilized 3. Under utilized	
110	If over utilization is the answer for question number 109, why?	1. Payment Free laboratory service 2. Fear of uncertainty 3. Unaware about the cost of laboratory investigation 4. Other (specify)_____	
111	If under utilization is the answer for question number 109, why?	1. I am not confident with the laboratory service 2. Unavailability of laboratory service 3. Expensive laboratory examination fee 4. Longer laboratory report issue time 5. Other (specify)_____	
112	How many laboratory requests do you send to your hospital laboratory daily on average?	1. Less than 10 2. 10 - 20 3. More than 20	
113	Why do you order laboratory investigation?	1. To confirm clinical impression 2. To reassure patient 3. To do a complete work	

		4. Others (specify)_____	
Part three-clinicians attitude and practice of laboratory request form completion[filling]			
114	What do you think of the importance of writing clinical diagnosis in laboratory request form?	1. Necessary in all case 2. Necessary but not in every case 3. Not necessary 4. Others (specify)_____	
115	Do you write clinical diagnosis when you order laboratory investigation?	1. No 2. Yes	
116	If your response to Q115 is Yes, How often do you write the clinical diagnosis?	1. Rarely 2. Sometimes 3. Often times	
117	Do you think that writing all the information on the request form is important?	1. Yes 2. No	
118	Do you write all information on the request form when you order laboratory investigation?	1. Yes 2. No	
119	If your response to Q118 is Yes, How often do you write all the information on the request form?	1. Rarely 2. Sometimes 3. Often times	
120	If your response to Q 118 is no, why?	1. Increased work load 2. I don't think it is important 3. Since I haven't seen such trend of filling clinical diagnosis	

		4. Other (specify)_____	
Part four- information concerning curriculum and some pre service orientation			
121	Have you taken some laboratory courses which give you some information about clinical laboratory in your university stay?	1. Yes 2. No	
122	Do you think including some clinical laboratory courses in your curriculum is important?	1. Yes 2. No	
122	Have you ever get some orientation or a kind of in-service training about laboratory request form completion?	1. Yes 2. No	
123	Do you think general laboratory orientation for newly employed clinician is important?	1. Yes 2. No	
Part five –information concerning collection of laboratory reports			
127	Do you collect all the laboratory investigation reports you sent to the laboratory?	1. Yes 2. No	
128	If your response to Q 127 is no, why?	1. I am not confident with the laboratory service 2. I sent it to reassure patient and hence I don't need the result 3. Long stay time to receive the	

		laboratory result 4. Other (specify)_____	

Annex 3: Information sheet and consent form

1. Background to the study

A clinical laboratory investigation is crucial in diagnosis and treatment of patients. However, in recent years inappropriate and excessive use of clinical laboratory facilities has become a cause of concern. Increased work load on the laboratory personnel is worsened by incomplete laboratory forms provided by the clinicians leading to rise in the rate of pre-analytical errors. Laboratory request forms provide information about the laboratory test being requested for. Correctly designed and properly completed request forms are essential for the performance of all laboratory tests to the benefit of the patient and the satisfaction of the requesting physician

2- Why the study is important

Evaluating the quality of request form to evaluate its completeness and assessing cost, proportion and type of uncollected report can have significant importance in avoiding misdiagnosis of any laboratory order, identifies area of improvement for better and effective completion of laboratory request form and timely collection of laboratory report and help in rational laboratory ordering by clinician after knowing the wastage of the laboratory due to uncollected laboratory report in the area.

3- What are the risks of participating in the study?

There is no risk related to participating in the study.

4- If you don't want to participate or discontinue

The information collected will not have any specific information including name that might Break your anonymity. You have the right not to participate in the study or can withdraw from

the study any time. You are also not forced to tell anything you don't want to answer regarding Yourself. If you have any questions, you may consult me by the following addresses

Muluberhan Ali (PI)

Department of Medical Laboratory Sciences, College of Health Science,

Addis Ababa University

Addis Ababa, Ethiopia.

Email: lozaderese@gmail.com

Tel: +251911363618

Signature: _____

Date: _____

5- Consent form

I, the undersigned, have read the provided information. I understood that the study is useful Without major health risks to me and agreed to participate in the study.

Signature of participant: _____

Annex 4: standard request format of Ethiopian hospital reform guideline and

Some sample request formats of the study hospitals

RF-01

HAWASSA UNIVERSITY COLLEGE OF MEDICINE & HEALTH SCIENCES

REFERAL HOSPITAL LABORATORY REQUEST FORMAT Date:_____

Name:_____Sex_____ Age:_____ Card No.:_____ Address:_____

Clinical dx_____Types of Specimen_____ Time of collection_____

Requested by_____Sign._____

☐ HEMATOLOGY	Tests	Result	Ref. Range	Tests	Result	Ref. Range
	☐ WBC count (K/µL)		4.0- 10.0 K/µL	☐RBC count(M/µL)		4.20 - 6.30 M/µL
	☐ Diff. count (%)			☐Hgb(g/dL)		12.0 - 18.0 g/dL
	Lymp.		10.0-58.5%L	☐Hct(%)		37.0 - 51.0 %
	Eosi.		0.1 - 24.0 %M	☐MCV(fL)		80.0-97.0 fL
	Mono. —MID			☐MCH(Pg)		26.0 - 32.0 pg
	Baso.			☐MCHC(g/dL)		31.0 - 36.0 g/dL
	Neut.		37.0 - 92.0 %G	☐ RDW(%)		11.5-14.5%
	☐PLT count (K/mL)		140 - 440K/µL	☐ ESR(mm/hr)		0-10/0-15 mm/hr
	☐MPV(fl)		0.0-99.8 fl	☐ Others		
	☐PCT(%)		0.00-9.98%			
	☐ PDW(10(GSD))		0.0-99.8 10(GSD)			
	☐ RBC Morphology					
	☐ WBC Morphology					
	Comment:					

Reported by_____Sign._____ Date:_____

Verified by_____Sign._____ Date:_____

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RF-03

HAWASSA UNIVERSITY COLLEGE OF MEDICINE & HEALTH SCIENCES

REFERAL HOSPITAL LABORATORY REQUEST FORMAT Date:_____

Name:_____Sex_____ Age:_____ Card No.:_____ Address:_____

Clinical dx_____Types of Specimen_____ Time of collection_____

Requested by_____Sign._____

☐SEROLOGY & IMM-HEMA	Test		Result	ref. range	Test		Result	ref. range
	☐ RPR/VDRL				☐ ASO			
	☐ Widal test				☐ CRP			
	☐ Weil-Felix				☐ H.pylori			
	☐ HBsAg				☐ RF			
	☐ HCV				☐ HCG			
	☐ ABO				☐ Coombs test	DAT		
	☐ Rh					IAT		
	☐ X-match	Major			Others			
		Minor						
	Comment:							

Reported by_____Sign._____ Date:_____

Verified by_____Sign._____ Date:_____

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RF-06

HAWASSA UNIVERSITY COLLEGE OF MEDICINE & HEALTH SCIENCES

REFERAL HOSPITAL LABORATORY REQUEST FORMAT Date:_____

Name:_____Sex_____ Age:_____ Card No.:_____ Address:_____

Clinical dx_____Types of Specimen_____ Time of collection_____

Requested by_____Sign._____

☐CLINICAL CHEMISTRY	Tests	Result	Ref. Range	Tests	Result	Ref. Range
	☐ RBS			☐ Creatinine		
	☐ FBS			☐ Uric acid		
	☐ SGOT/AST			☐ Total Protein		
	☐ SGPT/ALT			☐ Total cholesterol		
	☐ ALP			☐ HDL-C / LDL-C		
	☐ Bilirubin(T)			☐ Triglyceride		
	☐ Bilirubin(D)			☐ Potassium		
	☐ BUN			☐ Sodium		

RF-05

HAWASSA UNIVERSITY COLLEGE OF MEDICINE & HEALTH SCIENCES

REFERAL HOSPITAL LABORATORY REQUEST FORMAT **Date:**_____

Name:_____**Sex**_____ **Age:**_____ **Card No.:**_____ **Address:**_____

Clinical dx_____**Types of Specimen**_____ **Time of collection**_____

Requested by_____**Sign.**_____

	Semen analysis	Result	Ref. Value	Comment
SEMEN ANALYSIS	Appearance			
	Volume(ml)			
	PH			
	Viscosity			
	Sperm cell count(/ml)			
	Other Cells			
	Motility(%)			
	Morphology			
	Other test			

Reported by_____**Sign.**_____ **Date:**_____

Verified by_____**Sign.**_____ **Date:**_____

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RF-05

HAWASSA UNIVERSITY COLLEGE OF MEDICINE & HEALTH SCIENCES

REFERAL HOSPITAL LABORATORY REQUEST FORMAT **Date:**_____

Name:_____**Sex**_____ **Age:**_____ **Card No.:**_____ **Address:**_____

Clinical dx_____**Types of Specimen**_____ **Time of collection**_____

Requested by_____**Sign.**_____

	Semen analysis	Result	Ref. Value	Comment
SEMEN ANALYSIS	Appearance			
	Volume(ml)			
	PH			
	Viscosity			
	Sperm cell count(/ml)			
	Other Cells			
	Motility(%)			
	Morphology			
	Others			

Reported by_____**Sign.**_____ **Date:**_____

Verified by_____**Sign.**_____ **Date:**_____

☎ 046-220 87 03/046-220 09 98 ✉1560 **Fax. 046-220 54 21**

RF-01

HAWASSA UNIVERSITY COLLEGE OF MEDICINE & HEALTH SCIENCES

REFERAL HOSPITAL LABORATORY REQUEST FORMAT Date:_____

Name:_____ Sex_____ Age:_____ Card No.:_____ Address:_____

Clinical dx_____Types of Specimen_____ Time of collection_____

Requested by_____ Sign._____

☐ HEMATOLOGY

Tests	Result	Ref. Range	Tests	Result	Ref. Range
☐ WBC count (K/µL)		4.0- 10.0 K/µL	☐RBC count(M/µL)		4.20 - 6.30 M/µL
☐ Diff. count (%)			☐Hgb(g/dL)		12.0 - 18.0 g/dL
Lymp.		10.0-58.5%L	☐Hct(%)		37.0 - 51.0 %
Eosi.		0.1 - 24.0 %M	☐MCV(fl)		80.0-97.0 fL
Mono. —MID			☐MCH(Pg)		26.0 - 32.0 pg
Baso.			☐MCHC(g/dL)		31.0 - 36.0 g/dL
Neut.		37.0 - 92.0 %G	☐ RDW(%)		11.5-14.5%
☐PLT count (K/mL)		140 - 440K/µL	☐ ESR(mm/hr)		0-10/0-15 mm/hr
☐MPV(fl)		0.0-99.8 fl	☐ Others		
☐PCT(%)		0.00-9.98%			
☐ PDW(10(GSD))		0.0-99.8 10(GSD)			
☐ RBC Morphology					
☐ WBC Morphology					
Comment:					

Reported by_____Sign._____ Date:_____

Verified by_____Sign._____ Date:_____

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RF-03

HAWASSA UNIVERSITY COLLEGE OF MEDICINE & HEALTH SCIENCES

REFERAL HOSPITAL LABORATORY REQUEST FORMAT Date:_____

Name:_____Sex_____ Age:_____ Card No.:_____ Address:_____

Clinical dx_____Types of Specimen_____ Time of collection_____

Requested by_____ Sign._____

☐SEROLOGY & IMM-HEMA

Test	Result	ref. range	Test	Result	ref. range
☐ RPR/VDRL			☐ ASO		
☐ Widal test			☐ CRP		
☐ Weil-Felix			☐ H.pylori		
☐ HBsAg			☐ RF		
☐ HCV			☐ HCG		
☐ ABO			☐ Coombs test DAT		
☐ Rh			IAT		
☐ X-match Major			Others		
Minor					
Comment:					

Reported by_____Sign._____ Date:_____

Verified by_____Sign._____ Date:_____

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RF-06

HAWASSA UNIVERSITY COLLEGE OF MEDICINE & HEALTH SCIENCES

REFERAL HOSPITAL LABORATORY REQUEST FORMAT Date:_____

Name:_____Sex_____ Age:_____ Card No.:_____ Address:_____

Clinical dx_____Types of Specimen_____ Time of collection_____

Requested by_____ Sign._____

☐ CLINICAL CHEMISTRY

Tests	Result	Ref. Range	Tests	Result	Ref. Range
☐ RBS			☐ Creatinine		
☐ FBS			☐ Uric acid		
☐ SGOT/AST			☐ Total Protein		
☐ SGPT/ALT			☐ Total cholesterol		
☐ ALP			☐ HDL-C / LDL-C		
☐ Bilirubin(T)			☐ Triglyceride		
☐ Bilirubin(D)			☐ Potassium		
☐ BUN			☐ Sodium		
☐ Urea			☐ Other test		
Comment:					

Reported by_____Sign._____ Date:_____

Verified by_____Sign._____ Date:_____

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Item 14: Urine Test Order and Report Form

Item 14: Urine Test Order and Report Form

URINE TEST ORDER AND REPORT FORM			
Name:		**OPD** ☐	
MRN:		**IPD** ☐ **Ward:**	**Bed Number:**
Age:	**Sex:**		
Clinical history:			

	Result
Colour	_____
Appearance	_____
Protein	_____
Glucose	_____
pH	_____
Blood	_____
Ketones	_____
Bilirubin	_____
Pregnancy test (HCG)	_____
Other(describe below):	
_____	_____

Ordered by: _____ Sample collected by: _____
Date of order: _____ Date of collection: _____
Time of order _____ Time of collection: _____

Lab tech comments:

Name of lab tech: _____ Signature: _____
Date of analysis: _____ Time of completion: _____

Result checked/approved by: _____

Item 14: Urine Test Order and Report Form

URINE TEST ORDER AND REPORT FORM			
Name:		**OPD** ☐	
MRN:		**IPD** ☐ **Ward:**	**Bed Number:**
Age:	**Sex:**		
Clinical history:			

	Result
Colour	_____
Appearance	_____
Protein	_____
Glucose	_____
pH	_____
Blood	_____
Ketones	_____
Bilirubin	_____
Pregnancy test (HCG)	_____
Other(describe below):	
_____	_____

Ordered by:	_____	Sample collected by:	_____
Date of order:	_____	Date of collection:	_____
Time of order	_____	Time of collection:	_____

Item 11: Serology Order and Report Form

SEROLOGY ORDER AND REPORT			
Name:		**OPD** ☐	
MRN:		**IPD** ☐ **Ward:**	**Bed Number:**
Age:	**Sex:**		
Clinical history:			

Test ordered		Result
HIV serology rapid test	☐	_____
HIV serology by EIA	☐	_____
Cryptococcal Ag	☐	_____
Hepatitis B	☐	_____
Hepatitis C	☐	_____
TPPA/TPHA/RPR	☐	_____
Syphilis	☐	_____
Pregnancy test (HCG)	☐	
Other (describe):		_____
_____		_____

Ordered by: _____ Sample collected by: _____
Date of order: _____ Date of collection: _____
Time of order _____ Time of collection: _____

Lab tech comments:

Name of lab tech: _____ Signature: _____
Date of analysis: _____ Time of completion: _____

Result checked/approved by: _____

Item 11: Serology Order and Report Form

SEROLOGY ORDER AND REPORT			
Name:		**OPD** ☐	
MRN:		**IPD** ☐ **Ward:**	**Bed Number:**
Age:	**Sex:**		
Clinical history:			

Test ordered		Result
HIV serology rapid test	☐	_____
HIV serology by EIA	☐	_____
Cryptococcal Ag	☐	_____
Hepatitis B	☐	_____
Hepatitis C	☐	_____
TPPA/TPHA/RPR	☐	_____
Syphilis	☐	_____
Pregnancy test (HCG)	☐	
Other (describe):		_____
_____		_____

Ordered by: _____ Sample collected by: _____

Date of order: _____ Date of collection: _____

Time of order _____ Time of collection: _____

Lab tech comments:

Name of lab tech: _____ Signature: _____

Date of analysis: _____ Time of completion: _____

Result checked/approved by: _____

Item 10: Clinical Chemistry Order and Report Form

CLINICAL CHEMISTRY ORDER AND REPORT FORM				
Name:		**OPD** ☐		
MRN:		**IPD** ☐ **Ward:**		**Bed Number:**
Age:	**Sex:**			
Clinical history:				

Test ordered		Result		Reference	
SGOT	☐	_____	IU/L	_____	IU/L
SGPT	☐	_____	IU/L	_____	IU/L
ALP	☐	_____	IU/L	_____	IU/L
AST	☐	_____	IU/L	_____	IU/L
Sodium	☐	_____	MEQ/dL	_____	MEQ/dL
Potassium	☐	_____	MEQ/dL	_____	MEQ/dL
Calcium	☐	_____	mg/dl	_____	mg/dl
Creatinine	☐	_____	mg/dl	_____	mg/dl
Bilirubin direct	☐	_____	mg/dl	_____	mg/dl
Bilirubin total	☐	_____	mg/dl	_____	mg/dl
Blood urea nitrogen	☐	_____	mg/dl	_____	mg/dl
Total Protein	☐	_____	G/dl	_____	G/dl

Item 12: Microbiology Order and Report Form

MICROBIOLOGY ORDER AND REPORT FORM			
Name:		**OPD** ☐	
MRN:		**IPD** ☐ **Ward:**	**Bed Number:**
Age:	**Sex:**		
Clinical history:			
Sample type/site:			

Test ordered		**Result**
AFB smear	☐	_____
India Ink Stain	☐	_____
Gram Stain	☐	_____
Microbiology smear	☐	_____
C+S	☐	_____
Wet mount - direct microscopy	☐	_____
Other (describe):	☐	_____
VDRL	☐	_____
Skin scraping	☐	_____
Skin snip	☐	_____
Other (describe below):	☐	
_____		_____

Ordered by: _____ Sample collected by: _____
Date of order: _____ Date of collection: _____
Time of order _____ Time of collection: _____

Lab tech comments:

Name of lab tech: _____ Signature: _____
Date of analysis: _____ Time of completion: _____

Result checked/approved by: _____

Item 13: Stool Analysis Order and Report Form

STOOL ANALYSIS ORDER AND REPORT FORM			
Name:		**OPD** ☐	
MRN:		**IPD** ☐ **Ward:**	**Bed Number:**
Age:	**Sex:**		
Clinical history:			

Result

Consistency _____
Occult blood _____
Cells _____
Ova or parasite _____
Other _____

Ordered by: _____ Sample collected by: _____
Date of order: _____ Date of collection: _____
Time of order _____ Time of collection: _____

Lab tech comments:

Name of lab tech: _____ Signature: _____
Date of analysis: _____ Time of completion: _____

Result checked/approved by: _____

DECLARATION

I, the undersigned, Clinical laboratory student declare that this thesis is my original work in partial fulfillment of the requirement for the degree of Masters of Health laboratory management and quality assurance.

Name: _____

Signature: _____

Place of submission: School of medical laboratory technology, Addis Ababa University.

Date of submission: _____

This thesis has been submitted for examination with my approval as an advisor.

Name **Signature**

5. _____ _____

6. _____ _____

7. _____ _____