# Assessment of rational drug use patterns in Public Hospitals in North Gondar, Amhara National Regional State, Ethiopia

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# Assessment of rational drug use patterns in Public Hospitals in North Gondar, Amhara National Regional State,Ethiopia.

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## Executive Summery

**Background:** Rational use of drugs is an essential element in achieving quality of health and medical care for patients and the community as a whole**.** Irrational drug use is prevalent, especially in the developing countries due to irrational prescribing, dispensing, patient adherence, and drug availability. Studies of rational drug use patterns at hospital level are important in order to overcome the problem.

**Objective:** The objective of this study is to assess rational drug use pattern in public hospitals in North Gondar, Amhara National Regional state, Ethiopia, 2015.

**Methods:** A Hospital based cross-sectional study design was used to assess rational drug use patterns in North Gondar hospitals. A thousand prescriptions from outpatient pharmacy department which were written and dispensed from July 1, 2013 to Jun 30, 2014 and 384 patients who visited outpatient pharmacy departments were included in the study. Data was collected by prescription review and face –to-face interview. Descriptive statistics were done. Analysis of variance and chi square test was used to compare hospitals during data analysis.

**Results: -** Average numbers of drugs ranged from 1.67 to 1.90 with a mean of 1.76 (SD=0.883). Drugs prescribed by generic name were 92.6%. Percentage of drugs with antibiotics and injections were 25.6% and 5.6%, respectively. Ninety one point six percent, 97.4%, and 8.3% of patients had adequate knowledge about the dose, frequency and possible side effect of the dispensed drugs respectively. Average consultation and dispensing time spent between the patient and dispenser ranged from 2.06 to 3.13 and 1.13 to 1.44 with a mean of 2.3(SD=1.18) and 1.32(SD=0.93) minutes respectively. Average labeled drugs dispensed to patients were 25%.

**Conclusion: -** Average number of drugs, antibiotics and injections prescribing practice met the optimal value of WHO standards while patient consultation time, labeling of drugs and patient knowledge on dispensed drugs need improvement in order to enhance use of drugs by patients.

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# Table of Contents

List of figures



List of tables

## List of Abbreviations

DPH- Debark primary hospital

EDL- Essential drug list

FMHACA- Food, Medicine and Health care Administration and control Authority

GURH- Gondar university referral hospital

INRUD- International network of rational drug use

IRFSDU- Index of rational facility specific drug use

IRPCDU- Index of rational patient care drug use

IRDP- Index of rational drug prescribing

MPH- Metema primary hospital

SD- Standard deviation

STG- Standard treatment guide line

WHO- World health organization

# Chapter one -Introduction

## 1.1 Background

Rational use of drugs is an essential element in achieving quality of health and medical care for patients and the community as a whole[1]. Rational drug use is well recognized as an important part of health policy[2]. Medicines are an essential component of health care delivery. When used rationally, they produce the desired effect of improving patients' ailments[3]. The availability of good quality drugs along with their rational use is needed for effective health care[4].

The World Health Organization (WHO) suggests a set of drug use indicators that has proven useful in the investigation of drug prescribing patterns in health care facilities. Prescribing indicators have been used in several studies, showing problems in the pattern of drug prescribing in different regions of the world[5]. The indicators are based on the practice observed in samples of clinical encounters taking place at outpatient health facilities for the treatment of acute or chronic illnesses. The degree to which the prescribing practice conformed to the essential drug list, formulary or standard treatment guideline were also measured by searching for the number of drugs prescribed from essential drug list available. Prescribers can only treat patients in a rational way if they have access to an essential drugs list and essential drugs are available on a regular basis[6]. Good dispensing of medicines is an important component of rational medicine therapy in order to maximize the benefits and minimize the risks to end users[7].

According to the WHO standards, essential drugs are those drugs which the nation must have in sufficient quantities at all times for the management of the most common ailments that afflict the greater number of its population[8]. Medicines are the largest item of expenditure within the public health sector budgets of developing countries[9]. The concept of nationally developed formulary or selection based on the essential drugs has been introduced in both developed and developing countries' healthcare systems to concentrate resources on the most cost-effective and affordable drugs to treat prevailing health problems[10].

Irrational drug use is prevalent, especially in the developing countries due to irrational prescribing, dispensing, patient adherence, and drug availability[4]. Irrational prescriptions and use of drugs is a feature in health care settings of developing countries and is characterized by

poly pharmacy, excessive use of antibiotics and injections and use of drugs of doubtful origin[11, 12].

## 1.2 statement of the problem

In the world, it is estimated that over half of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take their medicine correctly. It can stimulate inappropriate patient demand, and lead to reduced access and attendance rates due to medicine stock outs and loss of patient confidence in health system. It can also reduce the quality of life and cost of health care is unnecessarily increased[13], development of resistance to antibiotics, adverse effects and economic burden on both patients and society. Irrational poly- pharmacy invites medicine-induced diseases like adverse drug reactions[14].

In developed countries between10% and 20% of the national health budget versus 20% and 40% in developing countries is spent in medicines expenditure[12, 15]. Moreover, one third of the world's population lives without regular access to essential drugs[16].

In Ethiopia, study indicates that there is over prescribing of antibiotics (58.1%) and injection (38.1%) [17], inadequate knowledge of patients for the potential side effects of their dispensed drugs (5.6%) [18], low labeling of drugs dispensed to the patient (8.47%) and lack of documentation of patient diagnosis on the prescription by prescribers [19].

Therefore, this study will be carried out rational drug use in north Gondar hospitals and also provides information for better understanding of the contribution of rational drug use in study hospitals.

## Chapter two- Literature review

A study on world health organization / international net work of rational drug use drug prescribing indicators at primary health care centers in Eastern province Saudi Arabia, the result of prescription showed that average number of drugs was 2.4, drugs prescribed by generic name was 61.2%, antibiotic prescribed was 32.2%, injection prescribed was 2% and drugs prescribed from the national essential drugs list or facility formulary was 99.2% [1].

A study on professional practices and perception towards rational use of medicines according to WHO methodology in United Arab Emirates, consultation and dispensing times were 10 min and 68 seconds, respectively. Average number of drugs written on prescription was 2.9, percent of prescriptions using generic name was 7.35%, percent of antibiotic containing prescriptions (31.1%), percent of injection containing prescriptions (2.9%), adherence to Standard Treatment Protocols (46%), adherence to the essential drug list (64%), patient's knowledge of correct dosage (55%), adequately labeled drugs (45%), patient's information (65%)[20].

Analysis of outpatient prescription indicators and trends in Chinese Jingzhou, the percentage of drugs prescribed by generic name was 69.2%, percentage of prescriptions with an antibiotic prescribed was 39.15%, percentage of prescriptions with an injection prescribed was 22.63%, and average number of drug per prescription was 2.04[21].

A study on assessment of drug prescribing practices using WHO prescribing indicators in a private tertiary care teaching hospital, Karnataka, India, and The average number of drugs was 2.99. The average percentage of drugs prescribed by generic name was 14.83%. Antibiotics and injection were written on the prescription 41.99% and11.04% respectively. A high number of drugs prescribed (70.26%) from the list of essential drug. The average consultation time was 12 min 49 sec. The average dispensing time was 4min 4 sec. The percentage of drugs dispensed was 95.54% and percentage of drugs adequately labeled was very low in the dispensed drugs i.e. 38.35 %.The average patients with drug dosage knowledge was also very low (31%). The result of the study revealed that the health facilities do not have any essential drug list .Out of 12 key drugs from the WHO list 11(91.67%) drugs are available. The results indicate a considerable scope for improving the prescribing pattern of drugs in the medical outpatient departments[14].

Drug prescribing pattern in the outpatient department of pediatrics in Ghaziabad, Uttar Pradesh, India average number of prescribed was 2.59 and antibiotics prescribing were 63.6%. Generic drugs prescribed were 42.5%. Only 44.1% drugs were prescribed essential drugs list [22].

Evaluation of prescription indicators established by the WHO in south Brazil, the average number of drugs prescribed was 2.03, and 72.8% of the drugs were prescribed by generic name, 80.3% were on the list of essential drugs, 21.7% were antibiotics and 2.4% were injectable drugs. The results were in accordance with WHO recommendations and were similar to those reported by other studies[23].

Prescription and patient-care indicators in healthcare services, in Ribeirão Preto, southeastern Brazil, the mean number of drugs per prescription was 2.2, which is compatible with data from the literature. The generic name of the medication was used in 30.6% of prescriptions, a proportion considered as low. Antibiotics were prescribed in 21.3% of prescriptions, with greater percentage among pediatricians (28.9%). Injections were prescribed in 8.3% of prescriptions, with greater proportion among clinicians (13.1%). The drugs prescribed in 83.4% of prescriptions were part of the list of standardized drugs, indicating the acceptance of this list by healthcare professionals. Mean duration was 9.2 minutes for appointments and 18.4 seconds dispensation, both considered as insufficient for effective patient care. 60.3% of all drugs prescribed were supplied. 70.0% of patients interviewed had adequate knowledge of how to take the medication prescribed[24].

Prescription and dispensing practices in public sector health facilities in Pakistan, The mean dispensing time was 38 seconds, the mean consultation time was 1.79 minutes and the average number of drugs per prescription turned out to be 2.7 out of which only 1.6 drugs were being dispensed from the facility. Average percentage of injection drugs prescribed was 15%[25].

A study on prescription pattern of clinicians in private health facilities in Kano, North western Nigeria, the average number of drugs written on a prescription was 3.2. Drugs prescribed by Generic were 55.40% while encounters with antibiotic prescription were high at 43.80%. About 91.20% of prescribed drugs were listed in the national essential drug list while 83.30% of the drugs for treatment of common health problems were available in these facilities. Nearly 18% of encounters had at least one injection prescribed[11].

A study on analysis of patient care and facility indicators in public health institutions in Kano state, Nigeria, The result of the study showed that the average consultation and dispensing time among the studied health institutions were within the range of 2.3 to 4.2 minutes and 24 to 36 seconds respectively. A high number of drugs prescribed conformed to National Essential Drugs List and were dispensed (90-96%) by the Hospitals Pharmacies. Most patients (80-95%) knew the correct dosages, but none of the dispensed drugs was adequately labeled. The availability of key drugs was 84% to 87%. AKTH is the only health institution with a hospital formulary which is not available to most care providers[26].

Drug prescription pattern in a Nigerian tertiary hospital, the average number of drugs per encounter in the facility was 3.04. Generic prescribing was low at 42.7 % while antibiotic prescription was high at 34.4 %. Injections were prescribed in 4 % of encounters[27].

Prescribing practices in two health care facilities in Warri, Southern Nigeria: A comparative study. Average number of drugs prescribed was 3.4. Generic prescribing was generally low (54% in the public hospital and 16% in the private hospital) while the percentage of encounters with antibiotics prescribed was high (75% in the public hospital and 55% in the private hospital) [28].

A study on assessment of drug use pattern using WHO prescribing indicators at Hawassa University teaching and referral hospital, south Ethiopia, average number of drugs was 1.9. The percentage of encounters in which an antibiotic or injection was prescribed was 58.1% and 38.1%, respectively. The Percentage of drugs prescribed by generic name and from an essential drug list was 98.7% and 96.6%, respectively[17].

Assessment of the quality of pharmaceutical service in Jimma Zone, oromia regional state, south west Ethiopia, in this study, the average number of drugs per prescription was 2.3.Most of the prescription (72.8%) was found to be legible. The percentage of prescription containing injections and antibiotics are found to be 12.8% and 34.8%, respectively. Only 5.6% of the patient had knowledge about the potential side effects of their medications. None of the patients had adequate knowledge about their medications. Only 92.9% of the prescribed drugs are dispensed to the patients. The average dispensing time for the patients is found to be 6.74 seconds[18].

Assessment of drug use practices and completeness of prescriptions in Gondar University teaching referral hospital, the mean number of drugs per prescriptions was 1.76. The generic name of the medication was used in 99.16 % of the prescriptions. Antibiotics were prescribed in 29.14 % of prescriptions and injections were prescribed in 28.50% of prescriptions. The drugs prescribed in 98.89% of prescriptions were part of the hospital essential drug list indicating the acceptance of this list by health care professionals. Patients age, sex and card number were written 86.64%, 67.93% and 73.54% respectively. Address of the patient and diagnosis were written 2.71% and 0.01% respectively. The correct name and strength of the drug were clearly stated in 80% of the prescriptions whereas dose, frequency and durations were clearly indicated in 81.38%, 76.07% and 82.01% of the prescriptions respectively. 33.42%, 96.69%, 72.56% and 16.09% of the prescriptions contain the name, signature, date and qualification of the prescribers. 80% of patients interviewed had adequate knowledge of how to take the medication prescribed. 61.29%, 29.03% and 19.35% of patients knew the precaution, strength and name of the drugs. From all drugs received by the patients only 8.47% were adequately labeled[19].

Assessment of patterns of drug use by using WHO prescribing, patient care and health facility indicators in selected health facilities in southwest Ethiopia, average number of drugs written on the prescription ranged from 1.98 to 2.24. The mean consultation time spent between the prescriber and patient were range from 5.47 to 6.50 minutes. The mean pharmacy dispensing time was 1.23 minutes to 1.25minutes[29].

A study on assessment of drug prescribing pattern in Dessie referral hospital, The average number of drugs per prescription was 1.8. Out of all prescribed drugs 91.7% were available in the national EDL and 93.9% of them were prescribed by generic name. The percentage of encounters prescribed with an antibiotic and injection were 52.8% and 31%, respectively[30].

Assessment of the degree of adherence to health facility indicators related to rational drug use in Selected Health Facilities of Amhara Region, Northwest Ethiopia. The percentage availability of key essential drugs was found to be 73.05%, availability of Essential Drug List (EDL), Standard Treatment Guidelines (STG), drug formulary and average stock out duration were 75%, 87.5% 75% and 34 days respectively[31].

## 2.1 Conceptual framework

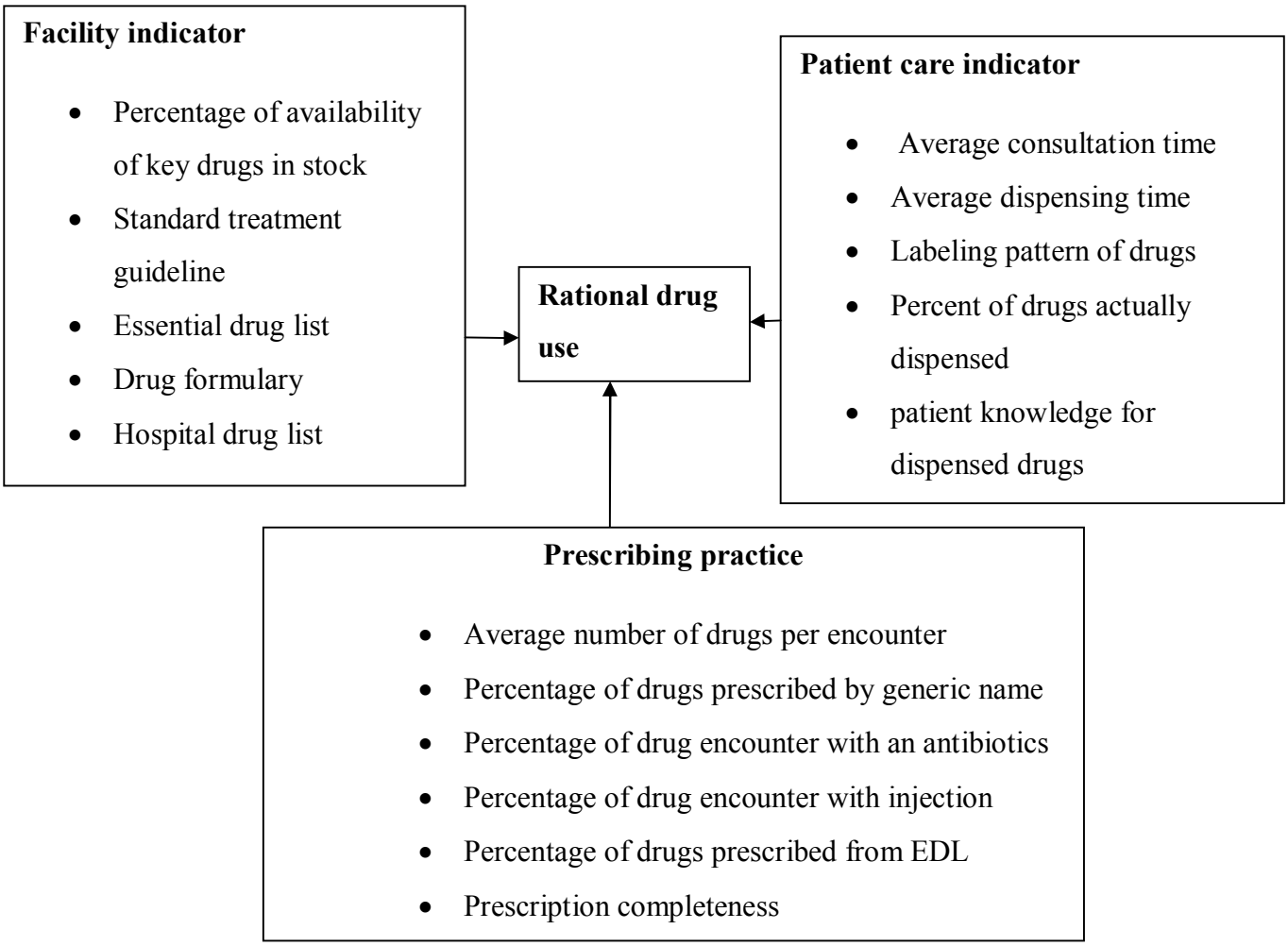


**Figure 1 .conceptual frame work** [32]

## 2.2 Significance of the Study

Drug use indicators were basically important in order to describe current treatment practices that are helpful for problem identification; identify whether a facility is exceeding or under a set standard of practice. The main focus this study was to assess rational drug use patterns in public hospitals in North Gondar, Amhara Regional state, Ethiopia. Therefore, this study would be used as a base line data order to determine factors that affecting rational drug use patterns in the public health facilities. The finding of the study would help individuals, partners and managers who were working at zonal and Regional health bureau and it would also contribute to increase the knowledge and awareness of the problems by Hospital administrative including the Hospital staffs to take appropriate intervention. In addition, this study would be useful to other researchers as reference material while conducting further studies on similar topic.

# Chapter three- objective of study

## 3.1 General Objective

To assess rational drug use patterns in public hospitals in North Gondar, Amhara National Regional state, Ethiopia.

## 3.2 Specific Objectives

- To assess prescribing practices of hospitals
- To assess patient care indicators in hospitals
- To assess the performance of facility specific indicators of hospitals

# Chapter four- Methods and Materials

## 4.1 Study Area and period

North Gondar Zone is located 733km and 168km away from the capital city of Ethiopia: Addis Ababa and the Amhara regional city; Bihar Dar respectively. North Gondar is bordered on the south by lake Tana,Gojjam, Agew Awi and the Benishangul-Gumuz Region, on the west by Sudan, on the north by the Tigray Region, on the east by Wag Hemra and on the southeast by south Gondar. It is the largest zone in the Amhara region. It has the population more than 3 million people; within the zone have three hospitals, one referral hospital(Gondar university Hospital) and two primary hospital (Debark and Metema Hospital). The study was conducted from January 1 to 30/01/ 2015.

## 4.2 Study Design

A hospital based cross-sectional study design was used to assess rational drug use patterns in North Gondar hospitals, 2015.

## 4.3 Population

### 4.3.1 Source population

All primary and referral hospitals in North Gondar, Amhara National Regional State and All prescriptions dispensed and all patients who visited the outpatient pharmacy during the study period.

### 4.3.2Study population/sample population

A thousand prescriptions from outpatient pharmacy department which were written and dispensed from July 1, 2013, to Jun 30, 2014 and 384 Patients who visited outpatient pharmacy departments were included in the study.

### 4.3.3Inclusion/ Exclusion criteria

**Exclusion criteria**

Patients admitted in the inpatient and emergency department pharmacy were not included in the study.

New hospitals which are started in 2015 year were not included in the study.

## 4.4 Sample size/Sample Procedure

The sample size of the population was more than 10,000

$$N = \frac{Z^2\, p\,(1-p)}{w^2}$$

w= the degree of accuracy required 5%

p= proportion 50% 1-p=q

z=significance level 95 % (1.96)

$$n = \frac{z^2\, p(1-p)}{w^2}$$

$$n = \frac{(1.96)^2\, 0.5(1-0.5)}{(0.05)^2}$$

n = 384.00

384 patients were used to maximize the response rate. To allocate the respondents, the data was used from each hospital patients visited outpatient department from July 1, 2013 to Jun 30, 2014 year. Total number of patients visited outpatient department in the past year in GURH, MPH and DPH were 175,467, 73,590 and 45,200 respectively. Total number of outpatients had got service from all hospitals was 294,257. The sample of the respondents was distributed by using simple proportion formula based on the total number of outpatients had got service in each hospital.

n= sample size of population x total number of patients visited outpatient department from the hospital /Total number of patients visited outpatient department from all hospital.

GURH = 384x175467/ 294257 = 229 patients

MPH=384x73590/ 294257= 96 patients

DPH=384x45200/ 294257= 59 patients

Interview respondents were selected by using non probability convenience sampling techniques from all hospitals which includes patients or caregivers for patients unable to speak and children.

A thousand of prescription was taken from outpatient pharmacy from a total of 228340 prescriptions in all study hospitals which were written and dispensed from July 1, 2013 to Jun 30, 2014 year. Total number of prescriptions in outpatient pharmacy GURH was 144828. Total number of prescriptions in outpatient pharmacy MPH was 52250 and Total number of prescriptions in outpatient pharmacy DPH was 31262. Sample prescription was distributed by using simple proportion formula based on the total number of outpatient had got service in each hospital.

n= sample size of prescription x total number of patients visited outpatient department from the hospital /Total number of patients visited outpatient department from all hospital.

GUR = 1000x175467/294257= 596 prescription

MPH=1000x73590/ 294257= 250 prescription

DPH=1000x45200/ 294257 = 154 prescription

Prescriptions were selected by using probability systematic sampling techniques from all hospitals.

K=N/n= the interval size, N= total number of prescription, n= sample size of the prescription

$K_{GURH}$= 144828/596=243$^{th}$ interval

$K_{MPH}$ = 52250/250= 209$^{th}$ interval

$K_{DPH}$= 31262/154= 203$^{th}$ interval

The sample prescriptions were selected based on the interval of the hospitals by using random lottery method from the first and the last interval of all hospitals.

## 4.5 Study variable

- Average dispensing time
- Average consultation time
- Percentage of drugs actually dispensed
- Patient knowledge to the dispensed drugs
- Labeling pattern of drugs
- Average number of drugs per encounter
- Percentage of drugs prescribed by generic name
- Percentage of drug encounter with an antibiotics
- Percentage of drug encounter with injection
- Percentage of drugs prescribed from EDL
- Percentage availability of key drugs in stock
- Standard treatment guideline
- Essential drug list
- Drug formulary
- Hospital drug list

## 4.6 Data collection procedure

A structured patient exit interview questionnaires were used assess patient knowledge on dispensed drugs. Stop watch was used to record patient consultation and dispensing time during patient contact with dispensary personal in outpatient pharmacy department. Observation check lists were used to assess facility indicators the availability tracer drugs within the hospitals were collected using bin cards and the availability of guide lines (reference materials) from drug information services within the hospitals. A prescribing indicator form was used to evaluate the prescription completeness. Observation check list were conducted by supervisors and patient interview, prescription completeness, consultation and dispensing time recording conducted by data collectors. To rank the performance of rational drug use indicators from the study hospitals index system were used. All the indicators had the same optimal index 1. The closer to 1, the more rational a drug use indicators. Indexes were calculated for each indicator by dividing the optimal by the expected value obtained.

For the purpose of data collection six data collectors who were degree and diploma holder pharmacy personal and three supervisors, who have a first degree in pharmacy and currently working in north Gondar zone was recruited.

## 4.7 Operational definition

**Essential medicines: -** The World Health Organization (WHO) defines essential medicines as the limited number of medicines that satisfy the needs of the majority of the population and that should be available at all times [(32)].

**Key (Tracer) drugs: -** means a total of 13 drug products are used to evaluate their availability in the study hospitals which should be relevant for public health priorities and should be expected to be available able at all times.

**Good medicine dispensing practice**: - refers to the delivery of the correct medicine to the right patient, in the required dosage and quantities, in the package that maintains acceptable potency and quality for the specified period, clear medicine information counseling and appropriate follow up[(7)] .

**Good Prescribing Practice (GPP):-** refers to prescribing the right medicine for the right patient, in the right dosage of the right formulation and for the right length of time [(3)].

**Dispenser**: means any person who is licensed or authorized to dispense drugs and/or medical supplies [(7)].

**Prescriber**: means health professionals include specialists, doctors, health officers, nurses degree and diploma who is licensed or authorized to write prescription.

**Rational drug use**: means patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community [(32)].

**Rational drug use pattern**: means a core model used to assess rational drug use indicators in the study hospitals which includes patient care indicators, prescribing indicators and facility specific indicators.

**Prescription:** means a legal paper the body should contains patient related information (name, age, sex, address, diagnosis, and card number), treatment (drug related information), and prescriber and dispenser information (name, signature, date and qualification).

### 4.8 Data Quality Control

Before data collection, the questionnaires were prepared English language and training was given for the data collectors and supervisors. A pre test was conducted in Debretabore general hospital (5% from the study sample) prior to the actual data collection time to assure accuracy and validity of the data collection tools. During data collection, principal investigator was done close supervision to overcome any mistakes from data collectors daily. On each data collection day, all the collected data were reviewed by principal investigator. After checking all questionnaires for consistency and completeness the supervisors were submit the filled questionnaire to the principal investigator. Incorrectly filled or missed records were sent back to the respective data collector for correction. To crosscheck the collected data and maintain the quality of data, the principal investigator was rechecked all the completed questionnaires daily.

### 4.9 Data Processing, Analysis and Interpretation

After data collection, data were checked for its completeness, coded, edited, cleaned, properly organized and analyzed. All responses to the survey questionnaires were coded and entered using SPSS version 16.0. The age of the respondents was recoding and re-categorizing. For descriptive statistics, univariate analysis like mean, standard deviation, frequency and percent were used. Bivariate analysis, one way analysis of variance and chi-square were used to compare hospitals. Results were presented using tables and bar chart.

### 4.10 Ethical Consideration

Ethical approval was obtained from Institutional Review Board (IRB) of College of Health Sciences, Jimma University to conduct the research at all North Gondar Hospitals and written consent obtained from the study hospitals. Prior to the interview patients verbal consent was obtained from the study participants to ensure their confidentiality.

### 4.11 Dissemination of the Results

The result of the study was submitted to Jimma University, College of Health Sciences, Department of Health Economics, Management and Policy. Then findings of the study will be

publicly defended at Jimma University. After approval by the department, Copies of the study findings will be provided to relevant stakeholders like Zonal and Regional Health Bureau and to all study Hospitals. An effort will be made to present the results at scientific conferences and to publish in a national or an international journal.

## Chapter – Five Results

From the total 384 respondents, male were contributes 213(55.5%). The mean age of respondents was 36.4(SD=17.218) years old. The majority of respondents were illiterate 168 (43.8%) followed by high school 80(20.8%) and college and above 48(12.5%). Place of residences of the study populations nearly half 195 (50.8 %) were from urban area. Marital status of the respondents, 202 (52.6 %) were married. Among respondents face-to-face interviewed from outpatient pharmacy, 329 (85.7 %) were patients and the rest were caregivers. Two hundred twenty six (58.9%) respondents were visited the hospital more than one times (table 1).

Table 1: Socio demographic characteristics of patients in north Gondar hospitals, January, 2015 (N=384)

| Characteristics | Frequency (No, %) |
|---|---|
| **Age range** | |
| 13-18 | 58(15.1) |
| 19-35 | 161(41.9) |
| 36-65 | 135(35.2) |
| >65 | 30(7.8) |
| **Sex** | |
| Male | 213(55.5) |
| Female | 171(44.5) |
| **Educational status of the patients** | |
| Illiterate | 168(43.8) |
| Read and write | 46(12) |
| Primary school | 42(10.9) |
| High school | 80(20.8) |
| Collage and above | 48(12.5) |
| **Place of residence of the patients** | |
| Urban | 195 (50.8) |
| Rural | 189 (49.2) |
| **Marital status of the patients** | |
| Single | 131 (34.1) |
| Married | 202 (52.6) |
| Divorced | 14 (3.6) |
| Widowed | 37 (9.6) |
| **Number of respondents** | |
| Patient | 329 (85.7) |
| Caregiver | 55 (14.3) |
| **Previous visit of the patients** | |
| Visited | 226 (58.9) |
| Not visited | 158 (41.1) |

## Prescribing indicators

Regarding prescription completeness, the result of patient related information in the study hospitals indicate that only 21.7% and 13.4% of patient's diagnosis and address were written on the prescription. Percent of signature and qualification of prescriber's information were written on prescription 95.5% and 25.2% respectively. Twenty nine point two percent of signature of the dispenser information was written on the Prescription. Only 6.3 % of qualification of the dispenser was written on the prescription (table 2).

**Table 2. Prescription completeness in north Gondar hospitals, from July 2013- Jun 2014 (N=1000)**

| **Indicator studied** | **GURH, Frequency (%) N= 596** | **MPH, Frequency (%) N=250** | **DPH Frequency (%)N=154** | **Total % Average** | **$X^2$** | **P value** |
|---|---|---|---|---|---|---|
| **Patient information** | | | | | | |
| Name | 99.8 | 100 | 100 | 99.9 | 0.679 | 0.712 |
| Age | 97.1 | 98.8 | 99.4 | 98.4 | 4.202 | 0.122 |
| Sex | 97.5 | 98.4 | 99.4 | 98.4 | 2.450 | 0.294 |
| Address | 5.4 | 30.8 | 3.9 | 13.4 | 1.223 | 0.001 |
| Diagnosis | 10.6 | 37.6 | 16.9 | 21.7 | 86.308 | 0.001 |
| Card number | 93.5 | 69.6 | 98.7 | 87.3 | 1.161 | 0.001 |
| **Prescriber information** | | | | | | |
| Name | 68 | 60.4 | 81.2 | 69.9 | 18.937 | 0.001 |
| Signature | 95.8 | 96 | 94.8 | 95.5 | 0.370 | 0.831 |
| Date | 85.2 | 95.2 | 92.2 | 90.9 | 19.711 | 0.001 |
| Qualification | 12.9 | 21.6 | 40.9 | 25.2 | 62.346 | 0.001 |
| **Dispenser information** | | | | | | |
| Name | 13.4 | 54.4 | 3.9 | 23.9 | 2.065 | 0.001 |
| Signature | 21.8 | 61.2 | 4.5 | 29.2 | 1.856 | 0.001 |
| Date | 11.1 | 45.2 | 3.9 | 20.1 | 1.618 | 0.001 |
| Qualification | 3.7 | 11.2 | 3.9 | 6.3 | 19.784 | 0.001 |

The result of drug related information, percent of correct name and strength of drugs written on the prescription was 97.6%. Ninety eight point six percent of dose the drug was written on the prescription whereas 99.2% of frequency of drugs was signed on the prescription (table 3).

**Table 3. Prescription completeness of drug related information in north Gondar hospitals, from July 2013- Jun 2014 (N=1000)**

| **Indicator studied** | **GURH, Frequency (%)** | **MPH, Frequency(%)** | **DPH Frequency (%)** | **Total % Average** | **$X^2$** | **P value** |
|---|---|---|---|---|---|---|
| **Drug related information** | **N=997** | **N=476** | **N=291** | | | |
| Correct name and strength | 970 (97.3) | 470 (98.7) | 282 (96.9) | 97.6 | 3.162 | 0.075 |
| Correct dose | 989 (99.2) | 475 (99.8) | 282 (96.9) | 98.6 | 11.663 | 0.001 |
| Correct duration | 989 (99.2) | 474 (99.6) | 284 (97.6) | 98.8 | 6.138 | 0.013 |
| Correct frequency | 992 (99.5) | 475 (99.8) | 286 (98.3) | 99.2 | 5.292 | 0.021 |

Concerning prescribing practices, the average numbers of drugs per encounter in the study hospitals ranged from 1.67 to 1.90 with a mean of 1.76(SD=0.883). The percentage of drugs prescribed by generic name was 92.6 %. Percentage of drugs encounter with antibiotics and injection were 25.6% and 5.6% respectively. Percentage of drugs prescribed from hospital essential drug list was 98.8% (table 4).

**Table 4. Prescribing practices in north Gondar hospitals, from July 2013 to Jun 2014(N=1000)**

| **Prescribing indicators** | **GURH (N=997)** | **MPH (N=476)** | **DPH (N=291)** | **Total Average** |
|---|---|---|---|---|
| Average number of drugs per encounter | 1.67 | 1.90 | 1.89 | 1.76(SD=0.883, ANOVA=0.001) |
| Percentage of drugs prescribed by generic name | 94.1 | 92.9 | 90.7 | 92.6($x^2$=3.080, p=0.001) |
| Percentage of drug encounter with antibiotics | 22.5 | 24.8 | 29.6 | 25.6($x^2$=2.435, p=0.001) |
| Percentage of drug encounter with injection | 3.8 | 9.2 | 3.8 | 5.6($x^2$=11.802, p=0.299) |
| Percentage of drugs prescribed from hospital essential drug list | 98.7 | 98.5 | 99.3 | 98.8($x^2$=4.150, p=0.001) |

The result of number of drugs written on the prescription indicates that, 47.5% of prescriptions contain one drug. Prescription that contains two drugs was 33.4% and prescription that contains greater than and equal to three drugs was 19.1%.

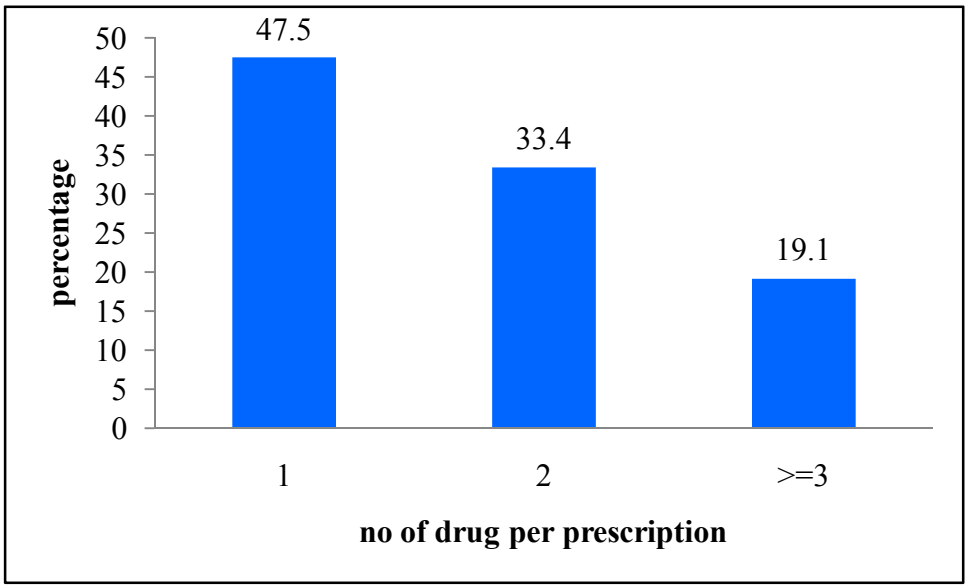


**Figure 2**. Number of drugs per prescription in the hospitals of north Gondar from July 2013 to jun2014 (N=1000)

## Patient care indicators

On evaluation of dispensing practices, average consultation time spent between the patient and dispenser was ranged from 2.06 to 3.13 with a mean of 2.3(SD=1.18) minutes. The average dispensing time spent between the patient and dispenser was ranged from 1.13 to 1.44 with a mean of 1.32 (SD= 0.93) minutes. Mean numbers of drugs prescribed to the patient during the study period were 1.94 (SD=0.918). On the day of data collection period, 93.2% of drugs were actually dispensed to patients within the hospitals. Only 25% of adequately labeled drugs were dispensed to patients (table5).

**Table 5. Dispensing practices in north Gondar hospitals, January, 2015.**

| **Patient care indicators** | **GURH N=229** | **MPH N=96** | **DPH N=59** | **Total Average** |
|---|---|---|---|---|
| Average consultation time(minutes) | 2.06 | 2.32 | 3.13 | 2.3(SD=1.18, ANOVA=0.001) |
| Average dispensing time (minutes) | 1.44 | 1.16 | 1.13 | 1.32(SD=0.93,ANOVA=0.011) |
| Average number of drugs prescribed | 1.79 | 2.22 | 2.08 | 1.94(SD=0.918, ANOVA=0.001) |
| Percent of drugs actually dispensed | 90.5 | 94.8 | 94.3 | 93.2($x^2$=7.447, p=0.001) |
| Percent of drugs adequately labeled | 23.7 | 24.4 | 26.8 | 25($x^2$=45.852, 0.001) |

The result of patient knowledge of on dispensed drugs in the study hospitals revealed that, 18.2%, 91.6%, 68.4%, 97.4 %, and 8.3% of patients had adequate knowledge about the name, dose, duration of treatment, frequency of administration and possible side effect of drugs respectively and 82.9% of patients had got advice for proper use of their medicines (table 6).

**Table 6. Knowledge of patient response to the dispensed drugs in North Gondar hospitals, January, 2015**

| **Knowledge of patients to the dispensed drugs** | **GURH Frequency (%) (N=229)** | **MPH Frequency (%) (N=96)** | **DPH Frequency (%) (N=59)** | **Total Average** | **$X^2$** | **P value** |
|---|---|---|---|---|---|---|
| Knew the name of drugs | 29.7 | 14.6 | 10.2 | 18.2 | 15.156 | 0.001 |
| Knew the dose of drugs | 81.2 | 96.9 | 96.6 | 91.6 | 20.441 | 0.001 |
| Knew the duration of treatment | 88.2 | 64.6 | 52.5 | 68.4 | 44.288 | 0.001 |
| Knew the frequency administration | 96.9 | 96.9 | 98.3 | 97.4 | 0.344 | 0.842 |
| Knew the possible side effect | 15.7 | 4.2 | 5.1 | 8.3 | 11.700 | 0.003 |
| Had got advice for proper use of their medicines | 80.3 | 80.2 | 88.1 | 82.9 | 2.031 | 0.362 |

## Health facility indicators

The result of health facility indicator based on observation check list, all hospitals had available hundred percent a copy Ethiopian essential drug list, drug formulary, standard treatment guide line and their Owen hospital essential drug list. Average percentage of key drugs available in stock on the day of study period was 82% (table 7).

**Table 7. Health facility indicator in north Gondar hospitals, January, 2015**

| Health facility indictor | GURH (%) | MPH (%) | DPH (%) | Total Average | $x^2$ | P value |
|---|---|---|---|---|---|---|
| Availability of copy of Ethiopian essential drug list | 100 | 100 | 100 | 100 | - | - |
| Availability of copy of standard treatment guide line | 100 | 100 | 100 | 100 | - | - |
| Availability of copy of drug formulary | 100 | 100 | 100 | 100 | - | - |
| Availability of hospital essential drug list | 100 | 100 | 100 | 100 | - | - |
| Percentage of availability of key drugs in stock | 69.2 | 84.6 | 92.3 | 82 | 2.437 | 0.296 |

Availability of key drugs in stock on the study day of period observed that, Artemether/lumefantrine tablet and ferrous salt plus folic acid capsule were out of stock in GURH. Zinc tablet was out of stock both GURH and MPH. Ergometrine maleate tablet was out of in all hospitals (table 8)

**Table 8. Availability of key drugs on the day of study period in north Gondar hospitals, January, 2015**

| No | Key drugs in the stock | GURH | MPH | DPH |
|---|---|---|---|---|
| 1 | Amoxicillin (capsule, suspension) | 1 | 1 | 1 |
| 2 | Oral rehydration salt | 1 | 1 | 1 |
| 3 | Artemether/lumefantrine tablet | 0 | 1 | 1 |
| 4 | Mebendazole tablet | 1 | 1 | 1 |
| 5 | Tetracycline eye ointment | 1 | 1 | 1 |
| 6 | Paracetamlol (tablet, syrup) | 1 | 1 | 1 |
| 7 | Refampicine/isoniazide/pyrazinamide/ethambutol tablet | 1 | 1 | 1 |
| 8 | Medroxyprogesterone(Depo) injection | 1 | 1 | 1 |
| 9 | Ergometrine maleate tablet | 0 | 0 | 0 |
| 10 | Ferrous salt plus folic acid capsule | 0 | 1 | 1 |
| 11 | Pentavalent DPT-Hep-Hib vaccine | 1 | 1 | 1 |
| 12 | Zinc tablet | 0 | 0 | 1 |
| 13 | Gentamycine injection | 1 | 1 | 1 |

**NB:** Yes= 1, No = 0,

Regarding index of rational drug use, maximum index (five) of rational prescribing practices in GURH, MPH and DPH were 4.93, 4.92 and 4.9 respectively. Maximum index (ten) of rational patient care indicators GURH (6.14) was higher than from MPH (5.86) and DPH (5.83). Maximum index (five) of rational health facility specific indicators MPH (4.69) was lower than from DPH (4.92) and GURH (4.85). The overall maximum index (20) of rational drug use GURH (15.76) was higher than DPH (15.65) and MPH (15.63) (table 9).

**Table 9. Index of rational drug use in North Gondar hospitals, Amhara region, Ethiopia**

| No | IRDU | GURH | MPH | DPH |
|---|---|---|---|---|
| | **Prescribing indicators** | | | |
| 1 | Index of non poly pharmacy | 1 | 1 | 1 |
| 2 | Index of generic name | .94 | .93 | .91 |
| 3 | Index of rational antibiotics | 1 | 1 | 1 |
| 4 | Index of safety injection | 1 | 1 | 1 |
| 5 | Index of hospital EDL | .99 | .99 | .99 |
| | Total IRDP | 4.93 | 4.92 | 4.9 |
| | Rank | 1 | 2 | 3 |
| | **Patient care indictors** | | | |
| 6 | Consultation time index | 0.07 | 0.08 | 0.11 |
| 7 | Dispensing time index | 1 | 1 | 1 |
| 8 | Dispensed drugs index | .91 | .95 | .94 |
| 9 | Labeled drugs index | .24 | .25 | .27 |
| 10 | Patients' knowledge correct drug name index | .3 | .15 | .1 |
| 11 | Patients' knowledge correct drug dose index | .81 | .97 | .97 |
| 12 | Patients' knowledge correct drug duration index | .88 | .65 | .53 |
| 13 | Patients' knowledge correct drug frequency index | .97 | .97 | .98 |
| 14 | Patients' knowledge correct drug side effect index | .16 | .04 | .05 |
| 15 | Patients' knowledge correct advice index | .8 | .8 | .88 |
| | Total IRPCDU | 6.14 | 5.86 | 5.83 |
| | Rank | 1 | 2 | 3 |
| | **Health facility specific indicators** | | | |
| 16 | Index of Ethiopian EDL | 1 | 1 | 1 |
| 17 | Index of STG | 1 | 1 | 1 |

| | | | | |
|---|---|---|---|---|
| 18 | Index of drug formulary | 1 | 1 | 1 |
| 19 | Index of hospital EDL | 1 | 1 | 1 |
| 20 | Index of key drugs in stock | .69 | .85 | .92 |
| | Total IRFSDU | 4.69 | 4.85 | 4.92 |
| | Rank | 3 | 2 | 1 |
| | Grand total | 15.76 | 15.63 | 15.65 |
| | Rank | 1 | 3 | 2 |

## Chapter –Six Discussions

The irrational use of drugs occurs in all countries and causes harm to people [12]. The diagnosis of the patient is important for pharmacists to know the consistency of diagnosis and drugs, audit prescription and know potential drugs interaction and contraindication [21]. The result of patient related information revealed that, the average percentage of diagnosis of the patients signed on the prescription was 21.7% (average ranged from 10.6% to 37.6%). MPH achieved the highest and DPH and GURH achieve the lowest. The difference between the hospitals was statistically significant p=0.001. This may be due to the pressure of clinical pharmacist to sign physicians the diagnosis of patient on the prescription. The result was low compared the guide lines recommendation of optimal value of 100%. This result was higher than the previous study done in Gondar university hospital 0.01% [19] but lower than a study done in ten Public Health Facilities Pakistan70 % [25]. Lowest diagnosis may be due to prescribers not giving emphasis to sign diagnosis of the patient on the prescription.

Only 13.4% (average ranged from 3.9% to 30.8%) of patients address were written on the prescription. The result was low compared with the ideal value of 100% but higher than pervious study done in Gondar university hospital, 2.71% [19]. There was a difference across the three hospitals were MPH has highest and DPH has lowest and the difference between the hospital was statistically significant p=0.001. The probable reason may be prescribers might get training or information to sign address of the patient on the prescription.

The result of prescriber information, 69.9% (average ranged from 60.4% to 81.2%) of prescribers name were signed on the prescription. This result was low with compared to optimal value of 100% but higher than previous study done Gondar university hospital 33.42 % [19]. DPH achieved the highest and MPH and GURH achieved the lowest and the difference between the hospital was statistically significant P=0.001. Only 25.2% (average ranged from 12.9% to 40.9%) of prescriber qualification was written on the prescription in the study hospitals. There was a difference between the hospitals DPH achieved the highest and GURH archived the lowest and the difference between the hospital was statistically significant P=0.001. The result was low the optimal value of 100% but slightly higher than the study done in Gondar university hospital 16.09% [19]. Low prescribing practices of prescriber information may be due to work load or may be lack of special attention of prescribers to sign prescriber information on the prescription.

Average percentage of dispenser information in the study hospitals showed that, the name, signature, date and qualification of dispenser were signed 23.9%, 29.2%, 20.1% and 6.3% on the prescription respectively. The result of MPH has higher achievement with compared to GURH and DPH and the difference between the hospital was statistically significant P=0.001. This may be due to the dispenser personal might got training or information to sign dispenser information on the prescription to confirm the correctness of dispensed medication. The result was very low from the optimal value of 100% but higher than the study conducted in Gondar University hospital only 0.35% prescription contains dispensers' signature [19]. Low percentage of dispenser information within the hospital may be due to work load or the negligence of the dispenser to complete dispenser information on the prescription.

The result of drug related information in the study hospitals showed that, 98.6%, 98.8% and 99.2% of dose, duration and frequency of drugs were signed on the prescriptions respectively. DPH has low achievement with compared to GURH and MPH and the difference between the hospital was statistically significant P=0.001, 0.013 and 0.021 respectively. The result was low the optimal value of 100% but higher than the study done in Gondar University hospital i.e. dose (81.38%), frequency (76.07%) and durations (82.01%) [19]. Probable reason of incomplete prescribing of drug related information may be prescribers might use non acceptable abbreviation of medications during prescribing of drug to the patient.

A high number of drugs prescribed to a patient increases the risk of drug interactions, affects compliance and suggests a tendency towards poly pharmacy [11]. The result revealed that the mean number of drugs per encounter was 1.76(SD=0.883) (average ranged from 1.67 to 1.90). Number of drugs per prescription was higher in MPH and lower in GURH and the difference between the hospital was statistically significant P=0.001. The result was met optimal value of poly pharmacy ≤3 drugs. The result was near similar to the study done in Hawassa University hospital 1.9[17] and Dessie hospital 1.8[30] and lower than the study done in health care center, south Brazil 2.03[23], 10 primary health care center in eastern provinces, Saudi Arabia 2.4[1] , 10 Public Health Facilities in Pakistan 2.7[25], in 10 health center Jimma Zone 2.3[18], 10 health facility, southeastern Brazil 2.2[24], Santosh medical hospital, India 2.59[22], four private hospitals and 12private medical clinics, united Arab Emirates 2.9[20], Private tertiary care teaching hospital, India 2.99[14], Amino kano hospital, Nigerian 3.04[27], 10 different private health

institution in Kano, north western Nigeria 3.2[11], two hospitals, Southern Nigeria 3.9[(28)]. The result of the study hospitals was encouraged. The result indicates that prescribers may have a tendency to toward prescribing only necessary medications to the patient.

Prescribing drugs by its generic name considered as a safety precaution for the patients as it gives clear identification and enables easy information exchange and allows better communication between health care providers [(12)]. Percentage of drugs prescribed by generic name in the study hospitals was 92.6% (average ranged from 90.7% to 94.1%). GURH has highest achievement and DPH has lowest achievement and the difference between the hospital was statistically significant P=0.001. The result was low the optimal value of 100% but near similar to study conducted in Dessie hospital 93.9 %[( 30)] and low in Hawassa University hospital 98.7 %[( 17)], higher than the study done in four private hospitals and 12private medical clinics, united Arab Emirates 7.35%[(20)], Private tertiary care teaching hospital, India 14.83%[(14)], 10 health facilities, southeastern Brazil 30.6%[(24)], santosh medical hospital, India 42.5%[(22)], two hospitals, Southern Nigeria 54%[(28)], 10 different private health institution in Kano, north western Nigeria 55.4%[11],10 primary health care center in eastern provinces, Saudi Arabia 61.2%[(1)] , Chinese Jingzhou hospital 69.2%[(21)], in health care center, south Brazil 72.8%[(23)]. High percentage of generic name of drugs prescribed in the study hospitals the reason may be prescribers' preference of essential drugs which are usually written in generic names as compared to other literature.

Over use and misuse of antibiotics results in an increase of antibiotic resistance which is one of the problems under the irrational use of antibiotics [(12)]. The result showed that average percentage of drug encounter with antibiotics was 25.6% (average ranged from 22.5% to 29.6%). DPH was prescribed high percentage of antibiotics with compared GURH. The difference between the hospital was statistically significant P=0.001. The reason may be due to high infectious disease might be increased antibiotics prescribe. The result was met the optimal level of ≤30%. The result of the study hospitals was better than the study done in four private hospitals and 12private medical clinics, united Arab Emirates 31.1%[20], 10 primary health care center in eastern provinces, Saudi Arabia 32.2%[(1)] , Amino kano hospital, Nigerian 34.4 %[(27)], 10 health center Jimma Zone,Oromia region 34.8%[(18)], Chinese Jingzhou hospital 39.15%[(21)], Private tertiary care teaching hospital, India 41.99%[(14)], 10 different private health institution in Kano, north western

Nigeria 43.8%[11], Dessie hospital 52.8%[30], Hawassa University hospital 58.1%[17], Santosh medical hospital, India 63.6%[22] and two hospitals, Southern Nigeria 75%[28]. The result of antibiotic prescribing practices of in the study hospitals was encouraged. Rational prescribing of antibiotics may prevent the emergence of drug resistant microorganisms.

Unhygienic use of injections can increase the risk of transmission of potentially serious pathogens, such as hepatitis, HIV/AIDS, and blood-borne diseases [17]. Average percentage of drug encounter with injection in the study hospitals was 5.6% (average ranged from 3.8% to 9.2%). The difference between the hospital was not statistically significant P=0.299. The result was near similar to half the optimal value ≤ 10 % and nearly two times lower than the study done four private hospitals and 12private medical clinics, United Arab Emirates 2.9%[20] and 10 primary health care center in eastern provinces, Saudi Arabia 2%[1] , unlikely from other studies done in Private tertiary care teaching hospital, India 11.04%[14], 10 different private health institution in Kano, north western Nigeria 18%[11], Dessie hospital 31%[30], Hawassa University hospital 38.1%[17], Chinese Jingzhou hospital 22.63%[21], ten public sector health facilities in pakistan 15%[25] and in 10 health center Jimma Zone, Oromia region 12.8%[18].

Average percentage of drugs prescribed form the hospital essential drug list in the study hospitals was 98.8% (average ranged from 98.5% to 99.3%). DPH has highest implementation as compared GURH and MPH and the difference between the hospital was statistically significant P=0.001. The result was low the optimal value of 100% and 10 primary health care center in eastern provinces, Saudi Arabia 99.2%[1]. The result was higher than the study conducted in Hawassa university hospital 96.6 %[17], 10 different private health institution in Kano, north western Nigeria 91.2%[**11**], Dessie hospital 91.7 %[30], health care center, south Brazil 80.3% [23] and 10 health facilities, southeastern Brazil 83.4 %[24], Private tertiary care teaching hospital, India 70.26%[14], four private hospitals and 12private medical clinics, united Arab Emirates 64%[20]. This may be due to prescribers may use the hospital essential drug list as a reference during prescribing of drugs to the patients. Prescribing drugs from hospital essential drug list may avoid wastage of drugs, improves cost effective use of patients and enhances rational prescribing practices of prescribers.

Regarding dispensing practices, the mean consultation time spent between the dispensers and patients was 2.3(SD=1.18) (average ranged from 2.06 to 3.13) minutes. Consultation time was

higher in DPH with compared to GURH and MPH. The difference between the hospital was statistically significant P=0.001.The result was low the optimal level ≥ 30 minutes and other studies conducted in six hospitals, Nigeria 2.3 to 4.2 minutes [26], four health center, south west Ethiopia 5.47 to 6.50 minutes [29], four private hospitals and 12private medical clinics, united Arab Emirates 10 minutes[20], Private tertiary care teaching hospital, India 12.49minutes[14], The result of short consultation time in the study hospitals the reason may be patient load, insufficient man power and the dispensing area may not be enough to provide enough patient care information to the patient.

The mean dispensing time of in the study hospitals were 1.32(SD=0.93) (average ranged from 1.13 to 1.44) minutes. GURH has highest dispensing time was used with compared to the rest two hospitals. The difference between the hospital was statistically significant P=0.011. The result was met the optimal value ≥60 second. The result was lower than the study done in private tertiary care teaching hospital, India 4.4minutes [14], The result was near similar to the study done in four health center, south west Ethiopia 1.23 minutes to 1.25minutes [29] and higher than with compared to other studies done in six hospitals, Nigeria 24 to 36 seconds [26], ten public sector health facilities in pakistan 38 seconds [25], four private hospitals and 12private medical clinics, united Arab Emirates seconds 68[20]. The difference between dispensing time may be lack of manpower or may work load.

Average percentage of adequately labeled drugs in the study hospitals was 25% (average ranged from 23.7% to 26.8%). labeled drugs dispensed to the patient was higher in DPH with compared to the two hospitals and the difference between the hospital was statistically significant P=0.001. The result was very low the optimal of 100% but, better than the study done in ten primary health care centers, Egypt, drug labeling practice was very poor at 0%[12] and Gondar university hospital 8.47 % [19] . Lower than the study done four private hospitals and 12private medical clinics, United Arab Emirates 45% [20] and Private tertiary care teaching hospital, India 38.35%[14], Inadequate labeling of drugs may lead to the patient misuse of drugs. In the study hospitals labeled drugs dispensed to the patient were seen only in the medicine bags. This may be due to lack of labeling system in the dispensary area.

Inadequate drug supply has its implications on patients' health status and patient's convenience and trust in health system [12].Average percentage of drugs actually dispensed to the patient in the

study hospitals was 93.2% (average ranged from 90.5% to 94.8%). GURH was dispensed low percentage of drugs with compared the rest two hospitals. The difference between the hospital was statistically significant P=0.001. The result was low the optimal value 100%. The result was near similar to the study conducted in 10 health center Jimma zone, Oromia region 92.9% [18] and Private tertiary care teaching hospital, India 95.54%[14]. The probable reason of inadequate supply of drugs within the hospital may due to non organized management of drug procurement system.

Patient's knowledge of correct drug use is highly beneficial to avoid drug over use and abuse; and prevent adverse effects that harm patient's health status [12]. Average result of patient knowledge on dispensed drugs revealed that, 91.6% (average ranged from 81.2% to 96.9%) of patients had adequate knowledge about the dose of their dispensed drugs. Low patients knowledge on the dose of dispensed drugs was seen in GURH with compared to the two hospitals. The difference between the hospital was statistically significant P=0.001. The result was low the optimal value of 100%. The result was near similar to the study conducted in six hospitals, Nigeria (85-95) [26], higher than in 10 health facilities, southeastern Brazil 70 %[ 24], four private hospitals and 12private medical clinics, united Arab Emirates 55%[20] and Private tertiary care teaching hospital, India 31%[14],

Patient knew the potential side effect of the dispensed drugs in the study hospitals was 8.3% (average ranged from 4.2% to 15.7%). Patients knew the potential side effects drugs Higher in GURH and lower the rest two hospitals and the difference between the hospital was statistically significant P=0.003. The reason may be higher level educated and chronic patients were served within the hospital. The result was very low the optimal value of 100% but higher than the study done in10 health center Jimma zone 5.6% [18]. Low patient knowledge may be due to majority of respondents in study hospitals were illiterate i.e. unable to recall the name and possible side effects dispensed drugs and may be the dispensers not provide full information to the patient correct use of drugs.

Regarding facility specific indicators, all hospitals had available copy of Ethiopian essential drug list, standard treatment guide line, drug formulary and their Owen hospital essential drug list. Higher than the study done four private hospitals and 12private medical clinics, united Arab Emirates 46%[20] and do not have any essential drug list in Private tertiary care teaching hospital,

India[15].There availability may be it will increase rational prescribing practices of medicines within the facility. Average percentage of key drugs available in stock on the day of study period was 82% (average ranged from 69.2% to 92.3%). The difference between the hospital was not statistically significant P=0.296.The result was low from optimal value of 100% available at all times and near similar to in 10 different private health institution in Kano, north western Nigeria 83.3%[11] and Private tertiary care teaching hospital, India 91.67%[(14)]. The result was higher than the study conducted in 8 health facility Amhara region, North West Ethiopia 73.05%[(31)]. Stock out of key drugs may be due to unexpected drug consumption within the hospital and may be unavailability of the selected key drugs from suppliers.

# Chapter- seven conclusions and recommendation

## 7.1 Conclusion

The result of prescription completeness like patient, prescriber, dispenser and drug related information were less than to the standards. The result of prescribing practices average number of drugs per encounter, percentage of antibiotic and injection prescribing met the standard while percent of drugs prescribed by generic name and percent of drugs prescribed from hospital essential drug list were low from the standard. The result of dispensing practice, patient dispensing time met the optimal value while patient consultation time and labeling of drugs were low from the optimal value. Patient knowledge on dispensed drugs was low from the optimal value. The result of facility specific indicators like STG, EDL, drug formulary and hospital EDL were available from all hospitals while availability of key drugs in the stock was less than from optimal value.

## 7.2 Recommendation

All hospitals

- Should provide training for prescribers to prescribe drugs by generic other brand name of drugs.
- Should motivate prescribers to use the patient and prescriber information on the prescription.
- Should promote dispenser personal to use long consultation time in order to avoid misuse of drugs by patients.
- Should support dispenser personal to establish labeling system of drugs to enhance correct use of drugs to the patients.

Gondar university referral hospital should available artemether/ lumefantrine tablet, ferrous salt plus folic acid capsules, zinc tablet and Ergometrine maleate tablet in the stock.

Metema primary hospital should available zinc tablet and Ergometrine maleate tablet in the stock.

Gondar university referral hospital should available Ergometrine maleate tablet in the stock.

The Amhara regional health bureau and north Gondar zonal health bureau

- Should provide training for prescribers and dispenser personals to improve rational prescribing and dispensing practices of medicines to enhance quality of patient care.
- Should monitor the availability of key drugs in the hospitals to ensure sustainable supply of drugs within the facility.

## References


1. El MahalliAA. WHO/INRUD drug prescribing indicators at primary health care centres in Eastern province, Saudi Arabia. Eastern Mediterranean Health Journal, 2012, Vol. 18 No. 11, EMH J
2. GrandA, HogerzeilVH, RuskampHMF. Intervention research in rational use of drugs: a review. Health Policy And Planning; 14(2): 89–102, Oxford University Press 1999
3. Manual for medicines good prescribing practice. Food, medicine and health care administration and control authority of Ethiopia. Second edition, May, 2012.
4. LalanKB, HirayRS, GhonganeBB. Drug Prescription Pattern of Outpatients In A Tertiary Care Teaching Hospital In Maharashtra. International Journal of Pharma and Bio Sciences. Int J Pharm Bio Sci 2012 July; 3(3): P 225 – 229
5. BeatrizM, FerreiraC. Rational use of medicines: prescribing indicators at different levels of health care. Brazilian Journal of Pharmaceutical Sciences vol. 49, n. 2, apr./jun., 2013.
6. LenjisaLJ, FerejaHT. A Retrospective Analysis of Prescribing Practices through WHO Prescribing Indicators at Four Selected Hospitals of West Ethiopia. Lenjisa and Fereja, J Bioanal Biomed 2014, 6:4
7. Manual for medicines good dispensing practice. Food, medicine and health care administration and control authority of Ethiopia. Second edition, May, 2012.
8. TayobS. Challenges In The Management Of Drug Supply In Public Health Care Centers In The Sedibeng District, Gauteng Province, 2012.
9. Reading material on drug store management & rational drug use for medical officers, nurses & pharmacists. State institute of health and welfare, Rajasthan December 2010.
10. MalikM, AzmiM AH, AkmalAS, AzharH. Why hospital pharmacists have failed to manage antimalarial drugs stock-outs in Pakistan? A qualitative insight. malaria research and treatment volume 2013. 2013.
11. TamunoI. Prescription pattern of clinicians in private health facilities in Kano,Northwestern Nigeria. Asian Pacific Journal of Tropical Disease (2011)235-238
12. AklAO, ElMahalliAA, AwadAE, MohamedAS. WHO/INRUD drug use indicators at primary healthcare centers in Alexandria, Egypt. Journal of Taibsh Universty medical science (2014) 9 (1), 54-64.
13. TaskeenM, AnithaN, AliRS, BharathR, KhanBA. A Study on rational drug prescribing pattern in Geriatric patients in Hyderabad Metropolitan. Journal of Drug Delivery & Therapeutics; 2012, 2(5), 109-113.
14. MathewB, RahulS, KumarS, DoddayyaH. Assessment of Drug Prescribing Practices Using WHO Prescribing Indicators in a Private Tertiary Care Teaching Hospital,

Karnataka, India. International Research Journal for Inventions in Pharmaceutical Sciences, September 2013 Vol 1 Issue 2.
15. A publication of the World Council of Churches. Promoting rational use of Medicines.No183 October-December 2006.
16. KawasakiE, PattenPJ. Drug Supply Systems of Missionary Organizations Identifying Factors Affecting Expansion and Efficiency: Case Studies from Uganda and Kenya, final report January 15, 2002. *apps.who.int/medicinedocs/documents/s21432en/s21432en.pdf. Accessed by 12/2014.*
17. AntenehAD. Assessment of drug use pattern using WHO prescribing indicators at Hawassa University teaching and referral hospital, south Ethiopia: across-sectional study. Desalegn BMC Health Services Research 2013, 13:170
18. TeshaleC, HusseinJ, MussaS. Assessment of the Quality of Pharmaceutical Service in Jimma Zone, Oromia Regional State, South West Ethiopia. International Journal of Pharmacy Teaching & Practices 2014, Vol.5, Issue 2, 960-966.
19. EndalkachewA, BirhanB,WubshetH .Assessment of drug use practices and completeness of prescriptions in Gondar university teaching referral hospital. Admassie et al., IJPSR, 2013; Vol. 4(1): 265-275
20. Bazigha K, et al. A study on professional practices and perception towards rational use of medicines according to WHO methodology in United Arab Emirates. Pharmacy Practice (Internet) 2010 JanMar;8(1)
21. JunZ, LinyuL, CheZ, YuanrongY, FengxiG , HengZ. Analysis of outpatient prescription indicators and trends in Chinese Jingzhou area between September 1 and 10, 2006-2009. African Journal of Pharmacy and Pharmacology Vol. 5(2), pp. 270-275, February 2011
22. GoelKR, Khanna**S**, VermaA, ShankarP, ChopraSV, DixitKR. Drug prescribing pattern in the outpatient department of pediatrics in Ghaziabad, Uttar Pradesh. Raj Kumar Goel et al. / International Journal of Pharma Sciences and Research (IJPSR), Vol 4: No 4 Apr 2013.
23. TaniseVA, SilveiraDH. Evaluation of prescription indicators established by the WHO in Getúlio Vargas – RS. Brazilian Journal of Pharmaceutical Sciences vol. 47, n. 2, apr./jun., 2011.
24. SantosV, OttatiSON. Prescription and patient-care indicators in healthcare services, in Ribeirão Preto, southeastern Brazil. Rev saude publica 2004; 38(6).
25. HafeezA, KianiAG,etal. Prescription and dispensing practices in public sector health facilities in Pakistan: Survey Report. Vol. 54, No. 4, April 2004
26. Chedi, AB Z, AguyeA, KwanashieI, OH. Analysis of patient care and facility indicators in public health institutions in Kano state, Nigeria. Chedi *et al.,* Nig. Journ. Pharm. Sci., October, 2009, Vol. 8 No. 2, P. 72 – 78

27. TamunoI, FadareJ. Drug prescription pattern in a Nigerian tertiary hospital. Tropical Journal of Pharmaceutical Research February 2012; 11 (1): 146-152.
28. ErahPO, OlumideG, OkhamafeOA. Prescribing practices in two health care facilities in warri, southern Nigeria: A comparative study. Tropical Journal of Pharmaceutical Research, June 2003; 2 (1 ): 175-182
29. MulugetaTA, WabeTN, RajuJN. Assessment of patterns of drug use by using world health organization's prescribing, patient care and health facility indicators in selected health facilities in southwest Ethiopia. Journal of Applied Pharmaceutical Science 01 (07); 2011: 62-66
30. AssenA. Assessment of drug prescribing pattern in Dessie referral hospital. Admassu Assen et al./ International Journal of Pharma Sciences and Research (IJPSR), Vol 5 : No 11 Nov 2014.
31. WubanteDN. Assessment of the degree of adherence to health facility indicators related to rational drug use in selected health facilities of Amhara region, northwest Ethiopia. International Journal of Pharma Sciences and Research (IJPSR). Vol 5 : No 04 Apr 2014
32. WHO policy perspectives on medicines. Promoting rational use of medicines: core components. World Health Organization Geneva, September 2002

# Annexes

## Annex I

Table 10. Optimal level of WHO/INRUD drug use indicators [12]

| Indicators | Optimal level | Optimal index |
|---|---|---|
| **Prescribing indicators** | | |
| Average number of drugs per prescription | ≤3 | 1 |
| % drugs prescribed by generic name | 100 | 1 |
| % prescriptions including antibiotics | ≤ 30 | 1 |
| % prescriptions including injections | ≤ 10 | 1 |
| % drugs prescribed from EDL | 100 | 1 |
| **Patient care indicators** | | |
| Average consultation time/min | ≥ 30 | 1 |
| Average dispensing time/second | ≥ 60 | 1 |
| % drugs actually dispensed | 100 | 1 |
| % drugs adequately labeled | 100 | 1 |
| % patients' knowledge of correct drug use | 100 | 1 |
| **Facility indicators** | | |
| % availability of copy of EDL, or Formulary | 100 | 1 |
| % availability of key drugs in the stock | 100 | 1 |

**Prescribing indicators calculated by:-**

1. Average number of drugs per prescription: the average was calculated by dividing the total number of different drugs prescribed, by the number of encounters surveyed.
2. Percentage of encounters with an antibiotic prescribed: Calculated by number of prescriptions with antibiotics divided, by total number of encounters, multiplied by 100.
3. Percentage of encounters with an injection prescribed: Calculated by number of prescriptions with injections divided, by total number of encounters, multiplied by 100.

4. Percentage of drugs prescribed by generic name: Percentage, calculated by dividing the number of drugs prescribed by generic name, by the total number of drugs prescribed, multiplied by 100.

5. Percentage of drugs prescribed from hospital essential drugs list: Percentage, calculated by dividing the number of drugs prescribed which are listed on hospital essential drugs list, by the total number of drugs prescribed, multiplied by 100.

6. Percentage of patient information (name, age, sex, address, diagnosis and card number): Percentage, calculated by dividing the number of prescriptions, by the total number of prescription, multiplied by 100.

7. Percentage of prescriber information (name, signature, date and qualification): Percentage, calculated by dividing the number of prescriptions, by the total number of prescription, multiplied by 100.

8. Percentage of dispenser information (name, signature, date and qualification): Percentage, calculated by dividing the number of prescriptions, by the total number of prescription, multiplied by 100.

9. Percentage of drug related information (correct name and strength, dose, duration and frequency): Percentage, calculated by dividing the number of drugs, by the total number of drugs prescribed, multiplied by 100.

**Patient care indicators calculated by:-**

1. Average consultation time: calculated by dividing the total number of consultation time spent dispenser with patient, by the total number of patients.

2. Average dispensing time: calculated by dividing the total number of dispensing time spent dispenser with patient, by the total number of patients.

3. Percentage of drugs actually dispensed: calculated by dividing the total number of drugs dispensed with patient, by the total number drugs prescribed to the patients, multiplied by 100.
4. Percentage of drugs actually labeled: Calculated by number of encounters with labeling divided, by total number of encounters, multiplied by 100.
5. Patient's knowledge about correct use of drug: Calculated by dividing the number of patients knowing their dispensed drug, by total number of patients, multiplied by 100.

**Annex II**

Verbal Consent Form

Hello. My name is _____ and I am here to collect data on assessment of rational drug use in your Hospital. The information you provide will help us to improve the quality of drug supply systems, which is vital to improve sustainable supply of drugs. We assure you that whatever information you provide will only be used for the purpose of this research and will not be made available to anyone. I appreciate you too much for your willingness and support to respond the interview. We also assure that the interview process will not bring any harm to you. We assure to you that, this study is surely confidential, thus your name is not needed.

Thank you very much!

## Data collection Tools

**English version interviewed type of questionnaire**

**Part one-Patient care indicators**

Please encircle the appropriate **code** for the answer sheet

<table>
<tr><td colspan="8">I. Socio-demographic characteristics</td></tr>
<tr><td>1</td><td colspan="7">Age =</td></tr>
<tr><td rowspan="2">2</td><td colspan="5" rowspan="2">Sex</td><td>Male=1</td><td>Female =2</td></tr>
<tr><td>1</td><td>2</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Educational status</td><td>Illiterate=1</td><td>Read and write =2</td><td>Primary school =3</td><td>High school =4</td><td>Collage and above study=5</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td rowspan="2">4</td><td colspan="5" rowspan="2">Place of residence</td><td>Urban=1</td><td>Rural =2</td></tr>
<tr><td>1</td><td>2</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Marital statues</td><td colspan="2">Single=1</td><td>Married=2</td><td>Divorced=3</td><td>Widowed=4</td></tr>
<tr><td colspan="2">1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td rowspan="2">6</td><td colspan="5" rowspan="2">Respondents</td><td>Patient =1</td><td>Caregiver=2</td></tr>
<tr><td>1</td><td>2</td></tr>
<tr><td rowspan="2">7</td><td colspan="5" rowspan="2">Previous visit</td><td>Yes=1</td><td>No =0</td></tr>
<tr><td>1</td><td>0</td></tr>
<tr><td colspan="8">II. knowledge of patients to dispensed drugs</td></tr>
<tr><td>8</td><td colspan="5">Do you remind the name of drug (s)?</td><td>1</td><td>0</td></tr>
<tr><td>9</td><td colspan="5">Do you know the dose of the drug(s)?</td><td>1</td><td>0</td></tr>
<tr><td>10</td><td colspan="5">Do you know the duration of treatment?</td><td>1</td><td>0</td></tr>
<tr><td>11</td><td colspan="5">Do you know the frequency of admin?</td><td>1</td><td>0</td></tr>
<tr><td>12</td><td colspan="5">Do you know the possible side effect?</td><td>1</td><td>0</td></tr>
<tr><td>13</td><td colspan="5">Do you get any advice regarding the proper use of your medicines?</td><td>1</td><td>0</td></tr>
<tr><td colspan="8">III. Dispensing practice</td></tr>
<tr><td>14</td><td colspan="7">Number of drugs prescribed = _____</td></tr>
<tr><td>15</td><td colspan="7">Number of drugs dispensed = _____</td></tr>
</table>

| | | | |
|---|---|---|---|
| 16 | Number of drugs adequately labeled= _____ | | |
| 17 | Consultation time | Minutes | Seconds |
| | | | |
| 18 | Dispensing time | Minutes | Seconds |
| | | | |

**Part two-prescribing indicators**

Name of health facility ———————————

Facility type ———————————————

| Patient information | | | | | | Drug related information | | | | | | | | | Prescriber information | | | | Dispenser information | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name(0/1) | Age(0/1) | Sex(0/1) | Adrss (0/1) | Dx (0/1) | Car. n(0/1) | #correct name& strength | #correct dose | # correct duration | #correct frequency | # drugs | #generics | #antib | # inj | # on EDL | Name (0/1) | Sign(0/1) | Date (0/1) | Qual.(0/1) | Name (0/1) | Sign(0/1) | Date (0/1) | Qual.(0/1) |
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NB:Yes=1, No = 0

**Part three- Health facility indicators**

**Observation check list-A**

Availability of key (tracer/essential) drugs in the hospital

Name of facility _____

Facility type _____

| No | Generic name | Availability of key drugs in stock at visiting time | |
|---|---|---|---|
| | | Yes | No |
| 1 | Amoxicillin (capsule, suspension) | | |
| 2 | Oral rehydration salt | | |
| 3 | Artemether/lumefantrine tablet | | |
| 4 | Mebendazole tablet | | |
| 5 | Tetracycline eye ointment | | |
| 6 | Paracetamlol (tablet, syrup) | | |
| 7 | Refampicine/isoniazide/pyrazinamide/ethambutol tablet | | |
| 8 | Medroxyprogesterone(Depo) injection | | |
| 9 | Ergometrine maleate tablet | | |
| 10 | Ferrous salt plus folic acid capsule | | |
| 11 | Pentavalent DPT-Hep-Hib vaccine | | |
| 12 | Zinc tablet | | |
| 13 | Gentamycine injection | | |

**Observation check list-B**

Facility indicators (please encircle the appropriate answers)

Name of facility _____

Facility type _____

| | | | |
|---|---|---|---|
| 1 | Availability of copy of Ethiopian essential drug list | Yes | No |
| 2 | Availability of copy of standard treatment guide line | Yes | No |
| 3 | Availability of copy of drug formulary | Yes | No |
| 4 | Availability of hospital drug list | Yes | No |