Drug Therapy Problem and its Contributing Factors among Pediatric patients with Infectious Diseases admitted to Jimma University Medical Center, South West Ethiopia: Prospective observational study

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A research thesis submitted to school of Pharmacy, Institute of Health, Jimma University for the partial fulfillment of the requirement for the Master of Science degree in clinical pharmacy**.**

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Faculty of Health Sciences

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Drug Therapy Problems and its Contributing Factors among Pediatric patients with Infectious Diseases admitted to Jimma University Medical Center, South West Ethiopia

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Abstract

Background: *Drug therapy problem is a significant challenge to provide high quality health care service for the patients. It is associated with morbidity, mortality, increased hospital stay and reduced quality of life. Moreover, pediatric patients are quite susceptible to drug therapy problems.*

Objective: *To assess drug therapy problems and its contributing factors among pediatric patients diagnosed with infectious disease admitted to pediatric ward of Jimma university medical center, from April 1 to June 30, 2018.*

Methodology*: Prospective observational study was conducted among pediatric patients with infectious disease admitted from April 01 to June 30, 2018. Drug therapy problems were identified by using Cipolle's and strand's drug related problem classification method. Patient's written informed consent was obtained after explaining the purpose of the study. Patient's specific data were collected using structured questionnaire. Data were entered into Epi data version 4.0.2 and then exported to statistical software package version 21.0 for analysis. To identify predictors of drug therapy problems occurrence, multiple stepwise backward logistic regression analysis were done. The 95% CI was used to show the accuracy of data analysis and statistical significance was considered at p-value <0.05.*

Results: *A total of 304 pediatric patients were included in the study. Of these, 226(74.3%) patients had at least one drug therapy problem during their hospital stay. A total of 356 drug therapy problems were identified among two hundred twenty six patients. Non-compliance (28.65%) and dose too low (27.53%) were the most common type of drug related problems while disease comorbidity [AOR=3.39, 95% CI= (1.89-6.08)], Polypharmacy [AOR=3.16, 95% CI= (1.61-6.20)] and more than six days stay in hospital [AOR=3.37, 95% CI= (1.71-6.64) were independent predictors of drug therapy problem occurrence.*

Conclusion and recommendation: *Drug therapy problems were common in pediatric patients with infectious disease in the study area. Presence of comorbidity, Polypharmacy and Prolonged hospital stay were the predictors of drug therapy problem in study area. Therefore, to overcome the significant gaps in pediatric pharmaceutical care, clinical pharmacists, Pediatricians and other health care professional have to work in collaboration.*

Keywords: *Drug therapy problem, Pediatric, infectious disease, Ethiopia*

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Abbreviations and Acronyms

ADR	Adverse Drug Reaction
AOR	Adjusted Odds Ratio
CDC	Center of Disease Control
COR	Crude Odds Ratio
DDI	Drug-Drug Interaction
DRP	Drug Related Problem
JUMC	Jimma University Medical Center
MRP	Medication Related Problem
PDDI	Potential Drug-Drug Interaction
PICU	Pediatric Intensive Care Unit
WHO	World Health Organization

1. INTRODUCTION

1.1 Background

Pediatrics are special population those younger than 18 years old. They differ from adults and within their age groups in body surface area, weight, and organ function development which affect the efficacy and safety of pharmacotherapy (1, 2). The immunity of children is not well developed. This made them vulnerable to serious and potentially lethal infectious disease (3).

Infectious disease is one of the most common medical problems of pediatric population in developing countries. As reported findings showed in sub-saharan African such as Egypt (4) and Ethiopia (5) about 70- 86.4% of infectious diseases were diagnosed among children. The most common infectious diseases identified among these children were sepsis, pneumonia, meningitis, malaria, acute gastroenteritis, upper respiratory tract infection and intestinal parasites. Therefore for managing these infectious diseases; antimicrobials such as penicillin G crystalline, gentamicin, ceftriaxone and ampicillin were routinely prescribed (6).

Antimicrobials are a cornerstone to treat infectious disease. However, its irrational selection and use will result the problem such as drug resistance, inappropriate dose, inappropriate frequency, inappropriate duration, adverse drug events and drug-drug interaction. Hence, health care professionals should give due attention during prescribing, dispensing and administering antibiotics for pediatric patients (7, 8).

Drug therapy Problem (DTP) is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcome. A potential DTP is not yet manifested, but if left unresolved, it may harm the patient. However, an actual DTP has results clinical manifestations like adverse drug reaction or therapy failure. DTPs may arise at all stages of the medication use process from prescription to follow up of the treatment (9, 10).

Different drug therapy problem classification systems are published in literatures. To date there is no consensus and uniform methods of classification of Drug therapy problem. However, according to Cipolle, Morley and Strand all DTPs can be categorized in to seven types including: Need additional drug therapy, unnecessary drug therapy, ineffective drug therapy, dosage too low , dosage too high, adverse drug reactions, and non-compliance (11, 12).

Different factors contribute for occurrence of DTPs. These includes: missing information, poor patient's knowledge of the drug use, poly-pharmacy, administration of drugs with a narrow therapeutic range, poly-morbidity, hepatic and renal impairment (13). Pediatric group of populations are at high risk for drug therapy problems. This may be due to difference in drugs pharmacodynamics, pharmacokinetic and clinical heterogeneity such as weight, body surface area, age and organ function development which are the determinants of dose and drug selection. In addition to these, there are a limited number of studies available concerning safety and effectiveness of the drugs in this specific group of population (14).

The differences in drugs pharmacokinetics and pharmacodynamics observed in children influence the choice of the drug, dose, dosage form and dosing interval (15). The pediatric medication-use process is complex and error prone because of the multiple steps required in calculating, verifying, preparing, and administering doses (16). These factor make the pediatrics to be at high risk for drug-related problems. Therefore, all pediatric prescriptions and medication orders must be checked for its appropriateness of the dose, route and frequency with a pediatrics dosing reference (17).

Involvement of pharmacist in health care team have crucial role in preventing and resolving drug therapy problems. For instance, presence of pharmacist in the health care team and improved communication of patients with physicians, nurses and pharmacists were reduce the occurrence of medication errors in pediatric patients (18). Similarly, in 2013, Ermindo R et al (19) reported that pharmacists contributed in the therapeutic optimization and prevention of iatrogenic events in pediatric patients. Therefore, involvement of pharmacists in the care of patients with infections associated with improved clinical and economic outcomes (20).

1.2 STATEMENT OF THE PROBLEM

Infectious disease are the major causes of morbidity and mortality among children worldwide especially, in developing countries (21). Drug therapy is one of the main therapies in managing infectious disease. However; irrational use of drug therapy results serious clinical, economical and psychological problem.

Prevalence of drug therapy problems in pediatric patients varies from country to country. The prospective cohort study conducted in China revealed that 82 DRPs were experienced by 69 patients and overall prevalence of DRPs was 21.0% (22). A total of sixty two DTPs were identified among pediatric patients in Pakistan. The most frequent DTPs were untreated conditions (25.80%), improper drug selection (19.35%) and drug interactions (9.67%) (23). Ineffective drug therapy, need additional drug therapy, drug interaction, adverse drug reaction and medication error were the common drug related problem reported in pediatric patients in different findings (24, 25).

Drug therapy problem is a key factor which will affect the outcome of therapy in pediatric patients. It is a clinical problem, unless intervention done on the spot of the problems occurrence and it must be identified and resolved in a manner similar to other clinical problems. Medication errors in pediatrics are common and 5% to 27% of all pediatric medication orders result in a medication error and pharmacists must contribute to their prevention (26). It causes significant mortality and morbidity. For example, In the United States it was reported that 7000 patient were died as a result of medication errors. Pediatric inpatients may have 3 times more medication errors than adult inpatients, and these errors are frequently harmful (27, 28).

Drug therapy problem caused pediatric patients to be admitted to the hospital. For example, a prospective observational study conducted among pediatric patients in Canadian teaching hospital showed that medication-related emergency department visit was found in 8.0% of patients. Out of these 65.0% were deemed preventable (29). Similarly study done in Brazilian hospital showed that 14.7% of the patients were admitted to pediatrics ward due to DRPs. Study done in Australia also reported that 4.3% of pediatric admissions were related to DRPs (30, 31).

Drug therapy problem also causes economic crisis in health care system. For example, in 1995 in USA, cost associated to drug-related morbidity and mortality was between $30.1 billion and $136.8 billion annually. Overall, in United States the cost of drug-related morbidity and mortality exceeded $177.4 billion in 2000. Hospital admissions accounted for nearly 70% ($121.5 billion) of total costs (32, 33).

Factors that contributes for occurrence of drug therapy problems in pediatric patients includes: polypharmacy, certain infectious and Parasitic diseases, type of admission, length of hospital stay and number of disease conditions (22, 34-36).

The rate of potential adverse events due to medication was higher in pediatric. For instance, a study conducted in pediatric intensive care unit (PICU) showed the the presence of pharmacists in PICU reduced the rate of serious medication errors from 29 to 6 per 1,000 patient /days (37). Similarly, It had shown that in PICU, as a result of pharmacists interventions a total of $9,135 cost per year was saved (38).

In general, prolonged hospitalizations, long-term care admissions, emergency department visits, additional physician office visits cost, morbidity ,mortality and additional prescription drugs were some of the consequences associated with DRPs (39).

Pattern of infectious disease in pediatric wards varies from country to country. Infectious diseases are the most common medical diagnosis among pediatric patients in Ethiopia (40). The magnitude of drug therapy problems and its contributing factors was not assessed among these populations in study setting as well as in Ethiopia. Consequently, this research aimed at assessing drug therapy problem and its contributing factors in pediatric patients with infectious disease admitted to Jimma university medical center.

1.3 Significance of the study

Pediatric is one of the special populations that are at high risk for DTPs since they have quite different pharmacokinetics and pharmacodynamics from that of the adult. Worldwide there are a limited number of studies available which are related to drug therapy problem in pediatric patients, particularly with infectious disease.

In the study setting there was no prior finding that identify prevalence of drug therapy problem and its contributing factors among patient with infectious disease in pediatric ward. So that the investigator believes that the finding of this study will provide a great contribution for patients, health institutions and policy makers by assessing the magnitude of drug therapy problem, identifying the type and predictors of drug therapy problem and also carrying out on spot intervention for each drug therapy problem identified. It can also be used as an input in empowering pharmaceutical care service and forwarding the significance of clinical pharmacist in pediatrics ward in the hospital.

Finally the investigator forwarded recommendations for each concerns body that helps to minimize the occurrence of drug therapy problem in the future. The result of this finding had invaluable contribution in clinical, economical and humanistic outcome for patient, parents and health institution. It will also be used as an input for further researchers.

2. LITERATURE REVIEW

2.1 Epidemiology and Categories of DTPs

Prevalence and types of drug therapy problems among pediatric patients varies through different studies in different countries. According to study conducted among children younger than 18 years in china, from three hundred twenty-nine included patients, 21.0% of the them experienced DTPs and dosing problems (42.7%) were the most frequently reported DRPs (22). Similarly, study done in Iraq showed that incorrect dose 33% was the most common DRPs identified (24). In India from a total of 150 followed study participants, 44% of the them were identified with at least one DRP and the most common DRPs identified was drug interactions (78.78%) followed by adverse drug reactions (41).

A prospective cohort study carried out in United Kingdom and Kingdom of Saudi Arabia indicated that from 737 children included, 45.2% of them experienced DRPs and dosing problems 258(54%) were the most frequently reported DRPs. Similarly, study done in London indicated that Sub-optimal drug effect (68%) was the predominant MRP (34, 42). As Ibrahim N et al (43) reported from a total of 1278 patients included, 16.5% of the patients develop ADR during their hospital stay. A multicenter study conducted in four French-speaking countries (France, Quebec, Switzerland and Belgium) showed that inappropriate administration technique (29%), untreated indication (25%) and supra-therapeutic dose (11%) were the main identified drug-related problems (19).

Prospective observational study done in Brazil showed that out of 4926 patients, 14.8% of them had DRPs on admission and ineffective treatment and ADR were the predominant DRPs (31). In California out of 281 medication order, 198 medication errors were identified. The most common type of medication error identified was incorrect dosage (44).

A prospective observational study conducted among children younger than 18 years in Egypt indicated that a total of 313 DRPs were identified among 60 patients with average of 5.22 problems per patient (25). The most commonly identified drug related problems were drug-drug interaction (45.69%) followed by unnecessary medication (31.95%). However, study done in

Cote divoire indicated that non-compliance (24.1%) was the main DRPs identified (45). Study done in Kenya showed that out of 405 patients chart reviewed, 307 (75.8%) contained at least one drug related problems (46).

Study conducted among children in Ethiopia showed that out of 285 study participants, 90(31.57%) of the patients experienced DTPs. The most frequently identified DTPs were dosing problems, with dose too low (34.9%) and dose too high 7.5% (35). Another study done in Ethiopia indicated that out of 233 included patients, 17(1.5%) of patients develop actual adverse drug events. Of these, 47.0 % were preventable (47).

Pediatric patients require special attention from health professionals in terms of drug interactions. The organs that are responsible for the excretion and elimination are not fully developed until 1 year of age. This result extended half-life of metabolized drugs which causes drug toxicity (48). According to retrospective cohort study conducted among hospitalized children showed 49% of admitted patients had more than one potential drug-drug interaction (PDDI) (49). Similarly, study done in Gondar revealed that 45.8% of pediatric patients had at least one PDDI. The most common interacting pairs of drugs were gentamicin + furosemide , Cotrimoxazole + methotrexate and phenytoin + Artemether (50).

2.2 Contributing factors for drug related problem

Different literatures showed different factors contributes for occurrence of drug related problem in hospitalized children. For instance, the finding reported from Hong Kong (22), Saudi Arabia(34), Kenya(46), London(42), Ethiopia (35, 36, 50) showed that polypharmacy, type of admission (transferred), sex(male), age, prescribing error, length of hospital stay, use of central nerve system, endocrine and antihistamine medicines, total number of disease conditions, certain infectious diseases were potential risk factors for occurrence of DRPs.

2.3 Drugs involved in Drug therapy problems

Studies showed that different class of drugs involved in drug therapy problems. For example, the finding reported from Brazil (31),California(44), USA(49), four French speaking countries (19) and Ethiopia (36) showed that anti-infective agents, antipyretics/analgesics, central nerve system agents, gastrointestinal agents and cardiovascular agent were the most common class of drug involved in DRPs.

2.4 Pharmacists interventions and acceptance rate

A pharmacist intervention is any relevant recommendations that will improve therapeutic outcome and quality of care. As a result of pharmacist's intervention many adverse events, reactions, potential drug-drug interaction, medication error and dose related problems were prevented (51).

In Argentina, pre interventional (11.4%) and post interventional (7.3%) study done showed that 4.1% of medication error rate was reduced as a result of pharmacist intervention(52). Similarly, study done India also revealed that DRPs were decreased from 70% to 17.5% within four month and medication non-adherence was reduced from 48.6% to 22.3% after clinical pharmacist intervention(53).

The recommendations of pharmacist were significantly accepted by health care professional in pediatric ward. Different acceptance rate of pharmacists intervention were reported by a variety of studies. For example, 65% in Egypt (25), 94.8%) in Cote divoire(45) and 81% in Canada (54)

During identification and resolution of DRPs, pharmacists provide different interventions for identified drug related problems. Substitution of drug therapy, accuracy of drugs administration modalities, dose adjustment, drug monitoring, adherence and counseling were most common intervention provided by pharmacists (19, 41, 55).

2.5 CONCEPTUAL FRAME WORK

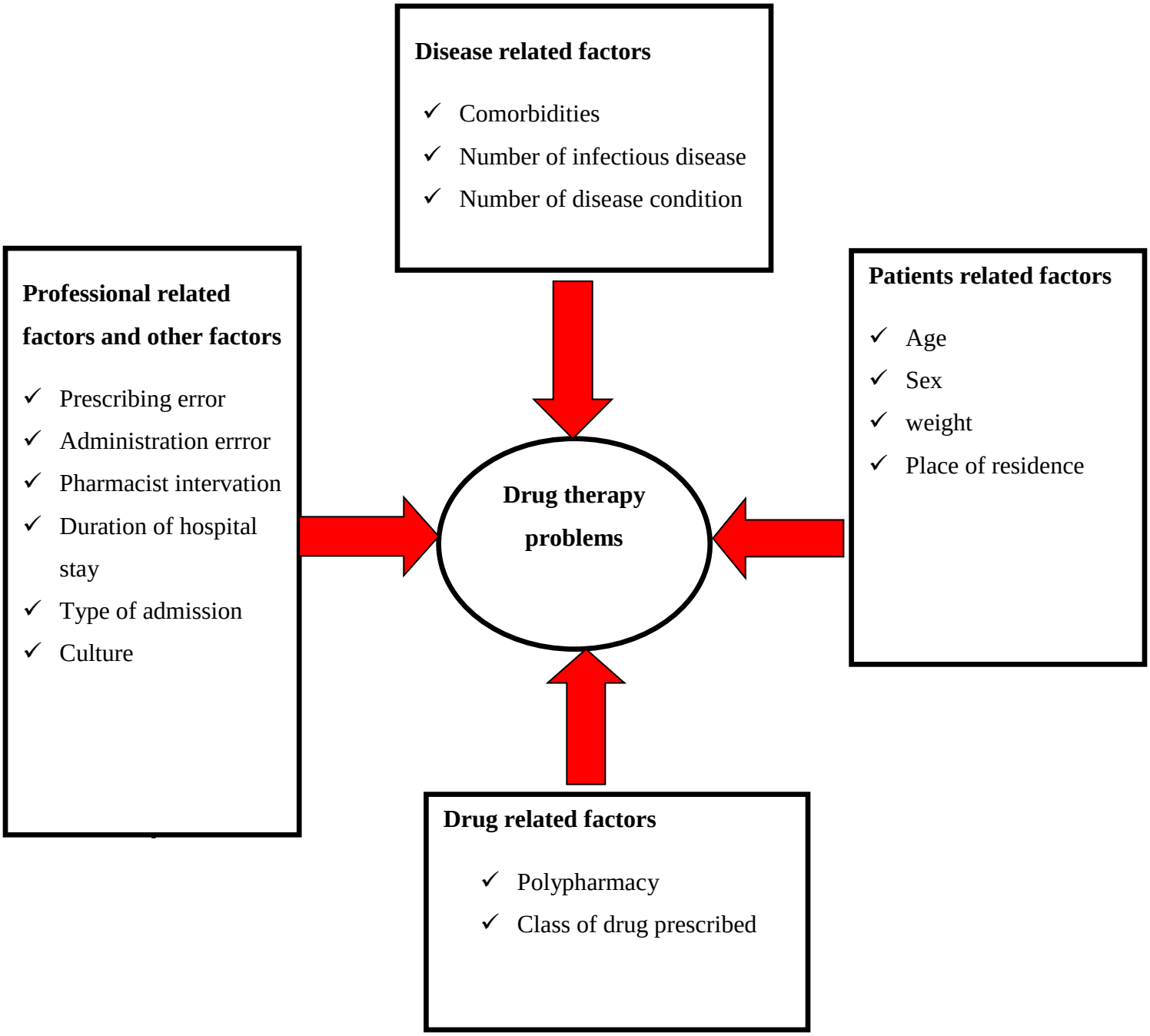


Figure 1: Conceptual frame work showing the contributing factors of drug therapy problem among pediatric patients which was adapted from literatures.

3. OBJECTIVES

3.1 General objective

- To assess drug therapy problem and its contributing factors among patient with infectious disease admitted at pediatric ward in JUMC from April 1 to June 30, 2018

3.2 Specific objectives

- To assess the prevalence of drug therapy problem among patient with infectious disease admitted to pediatric ward in JUMC from April 1 to June 30, 2018
- To identify type of drug therapy problem among patient with infectious disease admitted to pediatric ward in JUMC from April 1 to June 30, 2018
- To identify the reason of drug therapy problem among patient with infectious disease admitted to pediatric ward in JUMC from April 1 to June 30, 2018
- To identify contributing factors of drug therapy problem among patient with infectious disease admitted to pediatric ward in JUMC from April 1 to June 30, 2018

4. METHODOLOGY

4.1 STUDY AREA AND PERIOD

Study was conducted from April to June 2018 at pediatric ward of Jimma university medical center (JUMC), which is located in Jimma town; 352 km Southwest of Addis Ababa, Ethiopia. JUMC is the only teaching and referral hospital in the south western part of the country with bed capacity of 600. It provides services for approximately 9000 inpatient and 80,000 outpatient clients per year with a catchment population of about 15 million people. It has different wards. Pediatric ward is among the ward which has different unit such as: level I, Level II, neonatal unit, Intensive care unit and Oncology unit. Annually about one thousand six hundred twenty three patients with infectious disease admitted to pediatric ward of Jimma university medical center (56).

4.2 STUDY DESIGN

A prospective observational study design was conducted over all pediatrics patients with infectious disease admitted to JUMC from April 01 to June 30 2018.

4.3 POPULATION

4.3.1 SOURCE POPULATION

All pediatric patients with infectious disease admitted to JUMC during study period.

4.3.2 STUDY POPULATION

All pediatric patients with infectious disease admitted to JUMC during study period and who fulfill inclusion criteria.

4.4 SAMPLE SIZE AND SAMPLING TECHNIQUE

The sample size was calculated by using single population proportion formula based on the following assumption: Z= (1.96)2 , P =the prevalence of DTP in Zewditu hospital (31.57%) (35) with 95% confidence interval (CI) and marginal error (d) of 5%

$$n = \frac{Z_{\frac{\alpha}{2}}^{2} P (1 - P)}{d^{2}}$$

n= 332

Whereas:

n – Sample size=332

Z – Confidence interval at 95% = 1.96

P – The prevalence of DRP in pediatrics ward in Zewditu referral hospital in 2014 = 31.57%.

d – Margin of error = 5%

The size of the population is less than 10,000. Therefore; the sample size was corrected using the following correction formula.

$$Nf = n/(1 + \frac{n}{N})$$

$$Nf = 276$$

Where: n – Sample size=332

N – Number of pediatric patients with infectious disease admitted to JUMC in 2017=1623

NF=adjusted sample size

So, the total sample size after 10% of non-response added = 303.6~304 patients

All patients diagnosed with infectious disease admitted to pediatric ward during data collection period and who fulfilled the inclusion criteria were consecutively included in the study.

4.5 INCLUSION AND EXCLUSION CRITERIA

4.5.1 INCLUSION CRITERIA

- Patients admitted to pediatric ward of JUMC with in the study period.
- Age less than 18 years old
- Patient diagnosed with at least one infectious disease during the study period
- Patients whose parents gave and signed the informed consent.

4.5.2 EXCLUSION CRITERIA

- Readmitted patients for whom data was previously collected.
- Patient admitted in ICU
- The hospital admission was less than 24 hours

4.6 STUDY VARIABLES

4.6.1 DEPENDENT VARIABLE

Drug therapy problem

4.6.2 INDEPENDENT VARIABLES

Disease and drug related variables

- Number of drugs used
- Comorbidity
- Number of infectious disease
- Number of disease condition
- Class of drug prescribed

Professional related & other variables

- Type of admission
- Duration of hospital stay
- Culture
- Medication error
- Pharmacist intervention

Patient related variables

- Sex
- Age
- Weight
- Place of residence

4.7 DATA COLLECTION TOOL AND PROCEDURE

4.7.1 DATA COLLECTION PROCESS AND MANAGEMENT

Data were collected through medical record reviews and patient interview using a prepared structured questionnaire which was translated to Afan Oromo and Amharic language for patient interview to collect information on adherence, socio-demographic, medication and disease related issues. The data collection format (Annex III) was prepared by reviewing different literatures for important variables that used to assess drug therapy problems and its contributing factors. Its content includes: patient details, diagnosis, comorbidities, duration of hospital stay, review of system and patient's investigations, intervention taken, current and past medications. The data collection involved four pharmacists (bachelor degree) and one supervisor to organize the whole activities daily. The principal investigator reviewed all filled format so that any suggestion and corrections was given soon. Data collectors reviewed the medical chart by using prepared standard questionnaires' for all patients who fulfills inclusion criteria daily for their drug related need. Recommendations was done by a panel of experts of clinical pharmacist and forwarded to physicians and/or other health care provider during rounds.

4.7.2 DTPs IDENTIFICATION AND CLASSIFICATION

In this study drug therapy problems were classified according to Cipolle, Morley and Strand DTPs identification and classification method. The method was refined based on literature review and different treatment guidelines with further revision, and endorsement by panel of experts (Clinical Pharmacists).

The case (DTP) was identified by reviewing of patient's chart (pediatricians' note, Residents notes, medical interns' notes) and interviewing the parents/caregiver. The prescribed drugs were evaluated against different international (WHO 2016, CDC, Micromedex, Medscape, Nelson textbook of pediatrics 20th edition, Naranjo scale and different therapeutic guidelines) and national guideline (Ethiopian pediatric hospital care 2016) for their appropriateness in the order of indication, effectiveness, safety and drug interaction. The identified DTPs were classified as unnecessary drug therapy, needs additional drug therapy, ineffective drug therapy, dosage too low, adverse drug reaction, dosage too high and noncompliance.

4.8 DATA QUALITY ASSURANCE

The Questionnaires were translated from English to Afan Oromo and Amharic, and back translated into English by independent person to assure its consistency. Data was compiled, cleared, coded and checked for completeness and accuracy before entering into Epidata manager version 4.0.2. Double entry verification was made and data was analyzed using statistical software package, SPSS version 21.0. Training was given for four data collectors. The data collectors were also strictly supervised daily and the principal investigator reviewed all filled format so that any suggestion and corrections was given soon. A panel of experts (clinical pharmacists) assessed whether the data collection format would measure what it was intended to measure, and if it was comprehensive enough to collect all the information needed to address the purpose and goals of the study. Then a pretest was done on 16 (5%) patients and an appropriate change was made based on expert opinion.

4.9 DATA PROCESSING AND STATISTICAL ANALYSIS

All statistical tests were performed using statistical software package, SPSS version 21.0. Descriptive analysis was computed as frequency, mean and standard deviation (SD) for continuous variables and for categorical data. Binary logistic regression analysis was performed to examine the association between independent variables and drug therapy problem. In binary logistic regression analysis, variables with p values < 0.25 was selected for further multiple logistic regression analysis. Multiple logistic regression analyses were used to determine the independent predictors of occurrence of DTP. The Odds ratio with 95% confidence interval (CI) was calculated to measure the strength of association between predictor and outcome variables. Probability values less than 0.05 will be accepted as statistically significant. The out puts of processed data was presented using tables, graphs and figures accordingly.

4.10 ETHICAL CONSIDERATION

The ethical clearance was obtained from Jimma University research ethical board. The hospital director and head of the department of pediatrics was informed about the purpose of the study to get agreement and co-operation. Patients/parents had requested for written informed consent. To ensure patient confidentiality, name and address of the patient was not recorded in the data collection format. The drug therapy problems identified during the data collection were handled by the investigators for resolution to protect the patient from any potential risks or harms.

4.11 Dissemination plan

The result of this finding will be presented to the Jimma University, advisors and examiners. It is disseminated to school of pharmacy, institute of health, Jimma university medical center and other concerned bodies. The results of the finding will be published on reputable journal for international use.

4.12 Operational definition and Definition of terms

Infectious disease: is a disease caused by pathogenic microorganism such as bacteria, fungi, Virus, protozoa, worms and parasites.

Adverse drug reaction: is a noxious and unintended response to a drug which occurs at doses normally used for the prophylaxis, diagnosis, or treatment of disease that occurred during the study period (57).

Comorbidity disease: is a medical condition diagnosed other than infectious diseases and which its cause is not by microorganism .

Drug therapy problem: is any undesirable event experienced by a patient which involves, or is suspected to involve, drug therapy, and that interferes with achieving the desired goals of therapy, which can be identified using Nelson 20th ,Ethiopian pocket of hospital care for pediatric 2016, WHO 2016, and different pediatrics books.

Medication error: any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer (58).

Poly-pharmacy: defined as concomitant use of five or more prescription medications (59).

Pediatric Patient: is a patient whose age range from birth up to the age of 18 during the study period.

Neonate: pediatric age ranging from birth to 28 days

Infant: pediatric age ranging from 29 days to ≤1 years

Toddler: pediatric age ranging > 1year to ≤3 years

Preschool: pediatric age > 3years to ≤ 5 years

School age: pediatric age > 5years to ≤ 10 years

Adolescent: pediatric age > 10years to ≤15 years

5. RESULTS

5.1 Socio-Demographic characteristics of the study participants

Among 304 study participants included for study analysis 171 (56.3%) were male. About 116 (38.2%) of study participants were infant with the mean age of 2.97±1.53 years with the range of 3 days-15 years. About 194 (63.8%) of patients were residing in the rural area. The mean weight of patients was 11.06 ± 9 kg with the range of 1.12 to 38.9 kg; nearly one third of them 92(30.3%) were weigh < 5kg followed by weigh between 5-10 kg were 91(29.9%) (**Table 1**).

Table 1: Baseline socio-demographic characteristics of study participants of JUMC from April 1 to June 30, 2018.

variables	Frequency(%)n=304
Sex	
Male	171(56.3)
Female	133(43.7)
Age	
Neonate	42(13.8)
Infant	116(38.2)
Toddler	45(14.8)
Preschool	36(11.8)
School age	38(12.5)
Adolescent	27(8.9)
Weight (kg)	
<5	92(30.3)
5 to 9.9	91(29.9)
10 to 14.9	45(14.8)
15 to 19.9	25(8.2)
20 to 24.9	19(6.3)
≥25	32(10.5)
Place of residence	
Urban	110(36.2)
Rural	194(63.8)

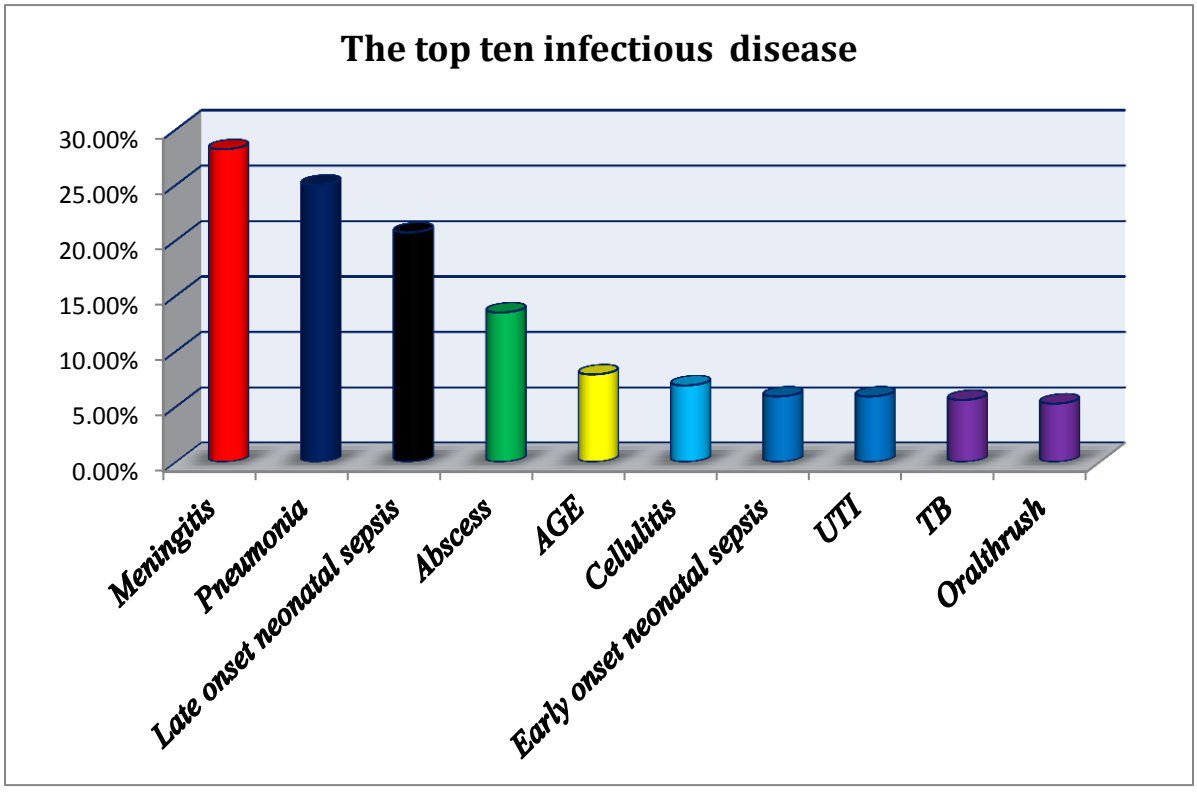
5.2 Clinical Characteristics of study participants

Of 304 patients included in the study, more than half of the patients had comorbidity 204(67.1%). About 42.1% of patients had stayed between six to ten days in hospital with the mean duration of 8.98 ±5.00. Most of the patients 212 (69.7%) were admitted to pediatric ward of JUMC by transferring from different health facilities. A total of 511 infectious diseases were diagnosed among all study participants. Nearly half of the study participants 145 (47.7%) had single infectious disease (**Table 2**). The most common infectious diseases diagnosed during the study period were meningitis 86(28.3%) followed by pneumonia76 (25%) and late onset neonatal sepsis 63(20.7%) **(Figure 2**) A total of 305 different comorbidities were diagnosed among 204 patients. The most common comorbidities were severe acute malnutrition (21.96%) followed by anemia (21.63%) and first episode of asthma (8.19%) (**Figure 3**).

Table 2: Clinical characteristics of pediatric patients with infectious disease admitted to pediatric ward of JUMC, from April 1 to June 30, 2018**.**

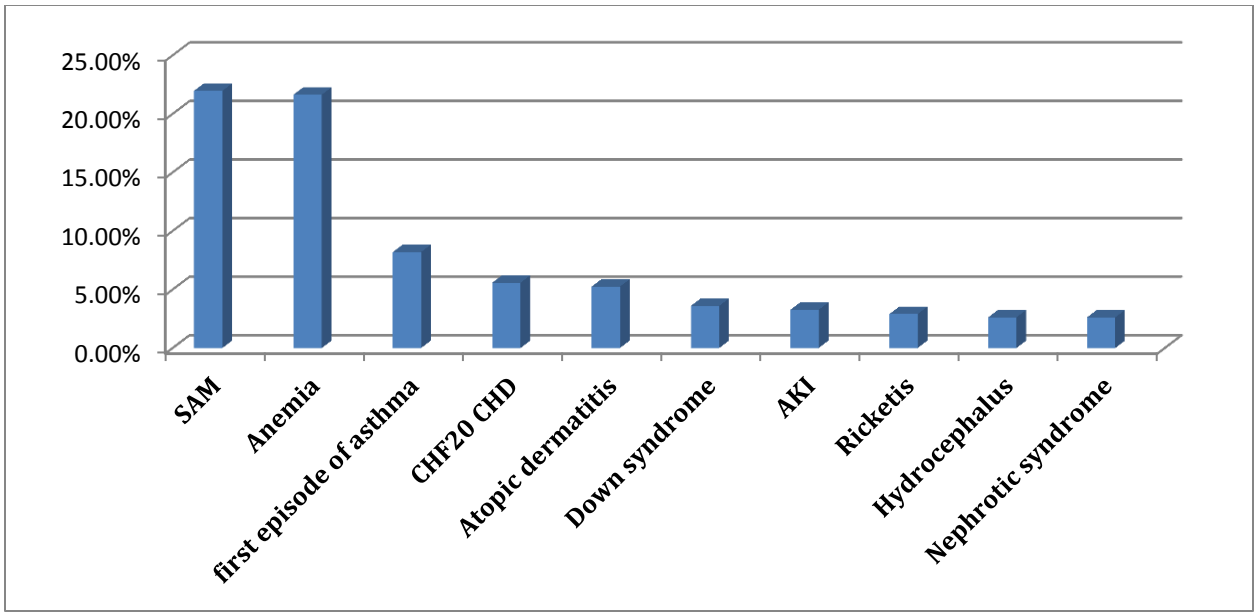
Variables	Frequency(% N=304)
Comorbidity	
Yes	204(67.1)
No	100(32.9)
Duration of hospital stay	
≤5 days	76(25)
6-10 days	128(42.1)
≥11 days	100(32.9)
Number of infectious disease	
1	145(47.7)
2	116(38.2)
≥3	43(14.1)
Culture done	
Yes	139(45.7)
No	165(54.3)

Number of disease condition	
1	49(16.1)
2	93(30.6)
3	88(28.9)
≥4	74(24.3)
Type of Admission	
New	92(30.3)
Transferred	212(69.7)



AGE: Acute gastroenteritis; TB: Tuberculosis; UTI; Urinary tract infection

Figure 2: The top ten infectious diseases diagnosed among patients admitted to pediatric ward of JUMC from April 1 to June 30, 2018.



SAM: severe acute malnutrition; AKI: acute kidney injury; CHF20CHD: congestive heart failure secondary to congenital heart disease

Figure 3: The top ten comorbidities diagnosed among patient with infectious disease at pediatrics ward of JUMC from April 1 to June 30, 2018

5.3 MEDICATION RELATED VARIABLES OF STUDY PATIENTS

A total of 1305 drugs were prescribed for 304 patients during study period. The mean number of drug per patients was 4.29 ± 1.74. The most commonly prescribed drugs were Paracetamol 192 (63.1%) followed by Ceftriaxone 186 (61.2%) and Gentamycin 161 (53%) (**Figure 4**). Among study participants; 127(41.77%) of them had polypharmacy (F**igure 5**).

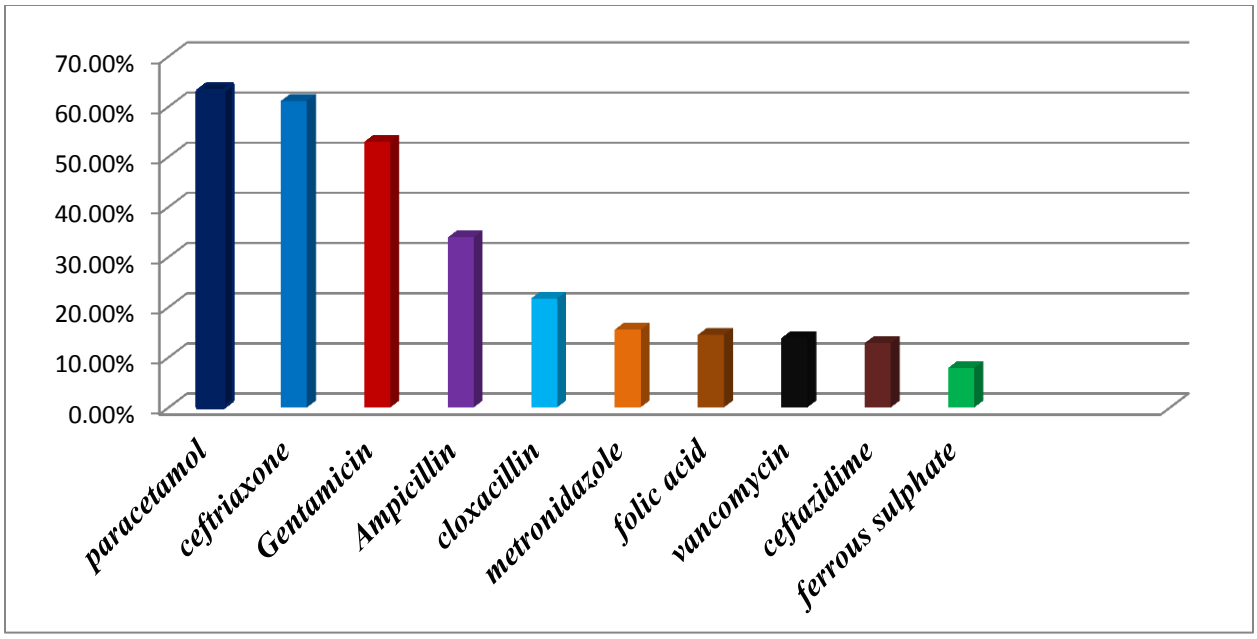


Figure 4: The top ten prescribed medications in pediatrics patients diagnosed with infectious in pediatrics ward of JUMC from April 1 to June 30, 2018.

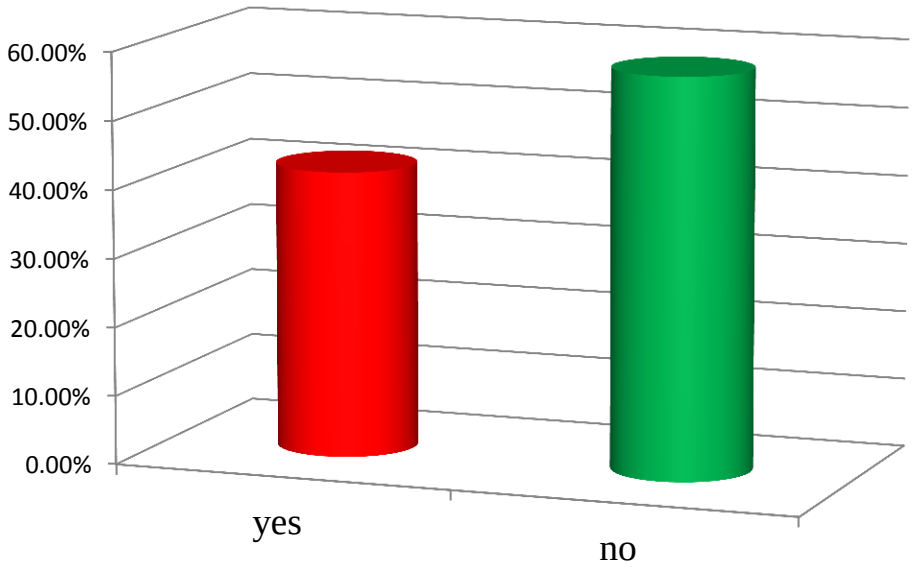


Figure 5: Polypharmacy among patients with infectious disease in pediatrics ward of JUMC from April 1 to June 30, 2018.

5.4 The Types and prevalence of Drug therapy Problems

From a total of 304 patients, 226 patients experienced drug related problems, with overall prevalence of 74.3%. During the study period a total of 356 DTPs were identified. From the study participants, 129 (57.1%) males' patients were exposed to drug therapy problems. The most common DTPs identified were non-compliance 102 (28.65%) followed by dose too low 98(27.53%) and in effective drug therapy 41 (11.5%) (**Figure 6**).

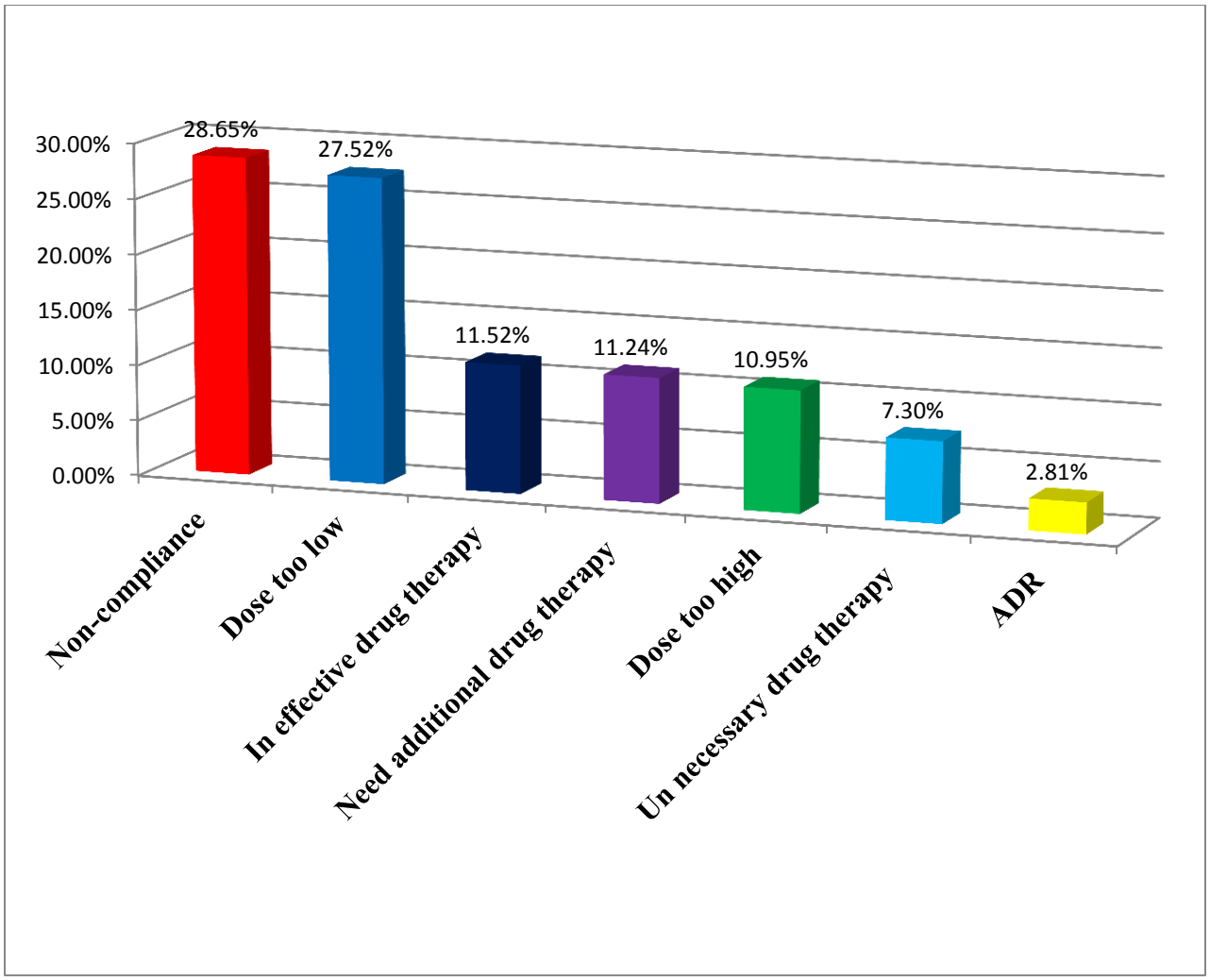


Figure 6: Types of Drug therapy problems identified among pediatric patients diagnosed with infectious disease at pediatric ward of JUMC from April 1 to June 30, 2018.

Table 3: The common reason of DTPs identified among pediatric patients diagnosed with infectious disease in pediatric ward of JUMC from April 1 to June 30, 2018.

DTP category and cause	Frequency n=226 (74.3)%
Non-compliance	**102(28.65)**
Caregiver does not understand the instructions	31(30.4)
Drug product is too expensive for the patient	29(28.43)
Omission(vein is not visible)	19(18.63)
Caregiver forgets to give the medication	12(11.76)
Drug product is not available for the patient	11(10.78)
Dose too low	**98(27.53)**
Dose is too low to produce the desired response	54 (55.10)
Dosage interval is too infrequent	28(28.57)
Drug interaction	13(13.27
Duration of drug therapy is too short	3(3.06)
Ineffective drug therapy	**41(11.52)**
Drug product is not an effective product	28(68.29)
Dosage form of the drug product is inappropriate	6(14.63)
Condition is refractory to the drug product	4(9.76)
Other*	3(7.32)
Need additional drug therapy	**40(11.23)**
A medical condition requires the initiation of drug	31(77.5)
Preventive drug therapy is required	5(12.5)
To attain synergistic effect	4(10)
Unnecessary	**26(7.3)**
Multiple drug products are being used	17(65.4)
No valid medical indication	9(34.6)

Dose too high	**39 (10.96)**
Dose is too high	16(41.02)
Drug interaction	15(38.46)
Duration of drug therapy is long	4(10.25)
Dosing frequency is too short	4(10.25)
Adverse drug reaction	**10(2.81)**
drug product causes an allergic reaction	4(40)
The drug product is contraindicated due to risk factors	6(60)

*** Microorganism develop resistance to drug product**

From 226 patients who had experienced DTPs, half of the patients 126 (55.75%) had one drug related problems, while 77 (34.07%) patients had two DTPs (**Figure 6**).

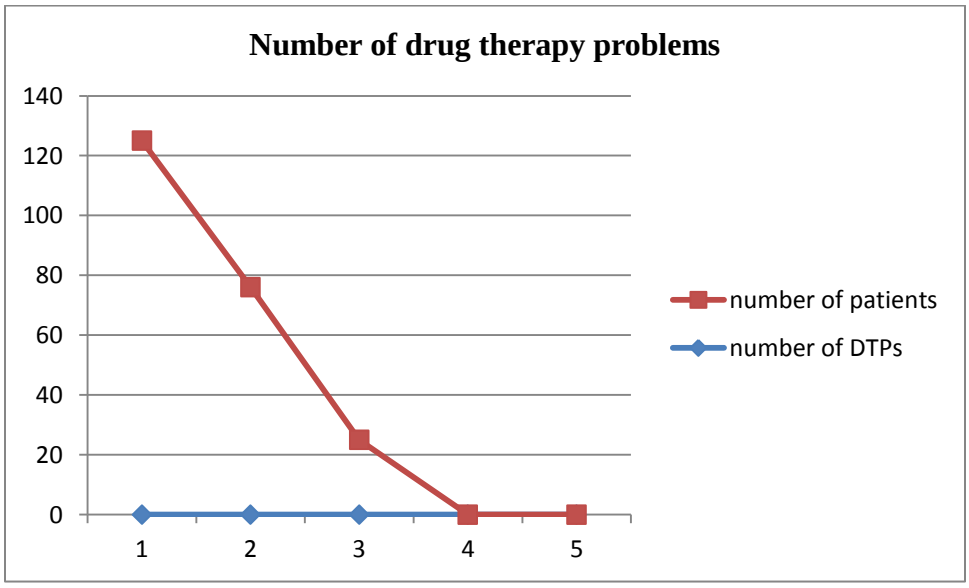


Figure 7: Number of drug therapy problems per patient who experienced drug therapy problem at pediatric ward of JUMC from April1 to June 30, 2018

5.5 The Types and percentage of medications errors

Among the study participants; 40.50% of patients had experienced mediation error. A total of 141 medication errors were occurred among 123 patients. Of these, two third of them were prescribing errors (68.79%) (**Table 4)**.

Medication error	**Frequency (%)**
Yes	123(40.50)
No	181(59.50)
Type of medication error	
Prescribing error	97(68.79)
Administration error	38(26.95)
Dispensing error	6(4.25)

Table 4: Medication error among pediatric patient with infectious disease in JUMC from April 1 to June 30, 2018

5.6 Drugs involved in Drug therapy Problems

Different classes of drugs were involved among the patients with drug therapy problems. The most class of drugs involved in DTPs were systemic anti-infective 271(76.12%) followed by Central nervous system medicine 16(4.49%). The most common drugs involved in DTPs were Gentamicin 62(22.87%) followed by Ampicillin 49(18.08%) (**Table 5)**.

Table 5: The Class of drugs involved in drug therapy problem among patients with infectious disease at pediatric ward of JUMC from April 1 to June 30, 2018.

Class	Frequency(%N=304)
Systemic Anti-infective medicines	271 (76.12)
Central nervous system medicines	24(6.74)
Gastrointestinal medicines	15(4.21)
Cardiovascular medicines	11(3.09)
Dermatological medicine	8(2.24)
Medicines used in endocrine disorder	6(1.69)
Respiratory medicines	5(1.40)
Others®	16(4.50)

® **Electrolyte and Acid base balance correcting drugs, Vitamins, Medicines affecting the blood, ophthalmic agents**

5.7 The Types and status of interventions carried out

The most common type of pharmacists interventions provided were change of the medication 89 (25%) followed by adherence andcounseling79(22.19%)(**Figure 8).** From the proposed interventions about 69.38% were fully accepted. In general the acceptance rate was 79.49 %(**Table 6).**

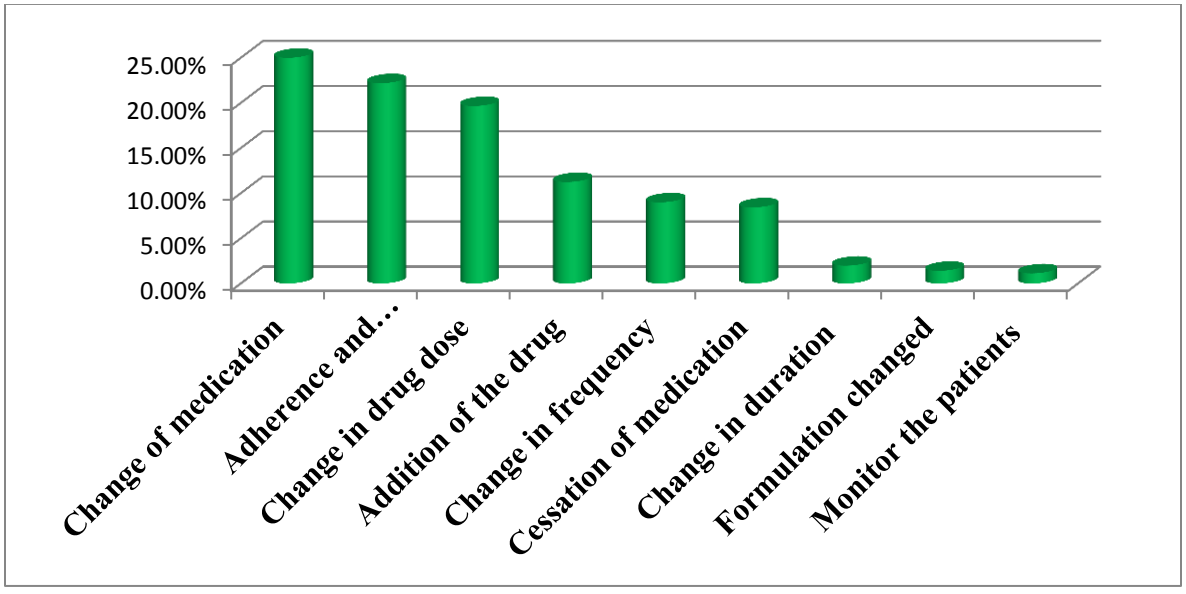


Figure 8: Type of intervention provided for patients diagnosed with infectious disease admitted to pediatric of JUMC from April 1 to June 30, 2018

Table 6: Status of recommendation of intervention provided for patient with infectious disease in JUMC, 2018.

Status of recommendation	Frequency (%)
Intervention accepted	247(69.38)
Refused	73(20.51)
Intervention accepted with modification	36(10.11)
Total	356(100)

Table 7: Example of drug therapy problems identified among patients with infectious disease at pediatric ward of JUMC from April 1 to June 30, 2018.

Need additional drug therapy	A 6 years old male patient weigh 21.2 kg was diagnosed with immune thrombocytopenia purpura + Tenia capitis but, no antifungal was prescribed for him. Then griseofulvin 375 mg po/day was recommended A 4 month old patient weigh 10kg was diagnosed with complicated meningitis + brain Abscess. But, no anti-anaerobic drug prescribed. Then metronidazole 90 mg IV tid was recommended.
Un-necessary drug therapy	A 7 months old patient weigh 6.6 kg was prescribed both Miconazole oral gel po bid and fluconazole 40mg/ml ½ TSP po BID for her oral thrush and fungal sepsis.
In effective drug therapy	A 4 years old patient weigh 12kg was prescribed Miconazole cream2% instead of Miconazole oral gel for her oral thrush.
Dose too low	For A 1 year old female patient weigh 3.9 kg was prescribed with ampicillin 195mg iv bid was prescribed instead of correct dose 195 mg iv QID for her late onset neonatal sepsis and meningitis. For four month old male patient weigh 6.4 kg ceftriaxone 160 mg iv bid was prescribed instead of correct dose 320 mg iv bid for his severe pneumonia + meningitis.
Dose too high	A 2 years old male patient weigh 9.6kg was prescribed phenytoin 75mg po bid instead of correct dose 75mg po daily for his maintenance dose of seizure treatment A three years old male patient weigh 12kg was prescribed furosemide 20mg iv qid instead of correct dose 10mg iv tid for his congestive heart failure.

ADR	A four years and eight month old female patient weigh 14.1 kg experienced clotrimazole induced maculopapular rash which was prescribed for her tinea corporis
Non-compliance	A care giver of a three years old patient who had tuberculosis planned to provide ethambutol one tab per day instead of two tablet per day for the patient.
Drug-drug interactions	Cimetidine + dexamethasone---- cimetidine will increase the level or effect of dexamethasone by affecting hepatic/intestinal enzyme CYP3A4 metabolism Furosemide + gentamicin---increased risk of ototoxicity and nephrotoxicity.
Medication error	For 1 month old neonate weigh 2.9kg gentamicin 1.5mg iv qd was prescribed instead of 15mg iv qd. For 1 year old infant cotrimoxazole was prescribed instead of clotrimazole for his tinea corporis.

5.8 Factors associated with drug related Problems

The result of bivariate analysis of independent variables and drug related problem showed that presence of comorbidity [COR=3.92, 95% CI:(2.29-6.74) P=0.0001], polypharmacy [COR=4.57, 95% CI:(2.42-8.62) P=0.00001], presence of more than three infectious disease [COR=2.95, 95% CI: (1.16-7.49) P=0.022], type of admission [COR=1.78, 95% CI: (1.03-3.06) P=0.036] ,duration of hospital stay 6-10 days [COR=3.70, 95% CI:(1.98-6.94)P=.0004] and more than ten days stay in hospital [COR=4.39, 95% CI: (2.20-8.75) P=.0002], presence of two medical conditions [COR=2.68, 95% CI:1.30-5.51], three medical conditions [COR=4.35,CI:(2.01-9.40)] and more than four medical conditions [COR=6.67,CI: (2.79-15.92)] were significantly associated with DTPs (**Table 8**)

Table 8: Bivariate analysis of factors associated with DTPs among patients with infectious disease admitted to pediatric ward of JUMC from April1 to June 30, 2018

Variables	DTP		COR	P-value
	Yes	No		
Sex				
Male	129(57.1%)	42(53.8%)	1.14(0.68-1.91)	0.62
Female	97(42.9%)	36(46.2%)	1	
Age				
Neonate	30(13.3%)	12(15.4%)	1	
Infant	88(38.9%)	28(35.9%)	1.25(0.56-2.77)	0.57
Toddler	36(15.9%)	9(11.5%)	1.60(0.59-4.30)	0.35
Preschool	25(11.1%)	11(14.1%)	0.90(0.34-2.41)	0.84
School age	28(12.4%)	10(12.8%)	1.12(0.41-2.99)	0.82
Adolescent	19(8.4%)	8(10.3%)	0.95(0.32-2.75)	0.92
Duration of hospital stay				
≤5 days	40(17.7%)	36(46.2%)	1	
6 to 10 days	103(45.6%)	25(32.1%)	3.70(1.98-6.94)	.0004*
≥11 days	83 (36.7%)	17(21.8%)	4.39(2.20-8.75)	.0002*

Comorbidity				
No	34(43.6%)	44(56.4%)	1	
Yes	170(75.2%	56(24.8%)	3.92(2.29-6.74)	0.0001*
Polypharmacy				
No	113(50%	64(72.1%)	1	
Yes	113(50%	14(17.9%)	4.57(2.42-8.62)	0.00001*
Number of infectious				
1	98(43.4%)	47(60.3%)	1	
2	91(40.5%)	25(32.1%)	1.74(0.99-3.06)	0.052*
≥3	37(16.4%)	6(7.7%)	2.95(1.16-7.49)	0.022*
Place of residence				
Urban	79 (35%)	31(39.7%)	1	
Rural	147 (65%)	47(60.3%)	1.22(0.72-2.08)	0.44
Type of admission				
New	61 (27%)	31(39.7%)	1	
Transferred	165 (73%)	47(60.3%)	1.78(1.03-3.06)	0.036*
Culture done				
Yes	105(53.5%	34(43.6%)	1	
No	121(50.2%)	44(56.4%)	0.89(0.53-1.49)	0.66
Weight (kg)				
<5	70(31%)	22(28.2%)	0.59(0.15-2.24)	0.44
5-9.9	69(30.5%)	22(28.2%)	0.58(0.15-2.20)	0.43
10-14.9	32(14.2%)	13(16.7%)	0.46 (0.11-1.85)	0.27
15-19.9	20(8.8%)	5(6.4%)	0.75(0.15-3.62)	0.72
20-24.9	16(7.1%)	3(3.8%)	1	
≥25	19(8.4%)	13(16.7%)	0.27(.06-1.13)	0.074*
Number of disease condition				
1	24(10.6%)	25(32.1%)	1	
2	67(29.6%)	26(33.3%)	2.68(1.30-5.51)	0.007*
3	71(31.4%)	17(21.8%)	4.35(2.01- 9.40)	0.0001*
≥4	64(28.3%)	10(12.8%)	6.67(2.79-15.92)	0.0001*

Predictors of DTPs occurrence in study populations

Multivariate logistic regression analysis was carried out to identify independent predictors of occurrence of DTPs among the study participants. Accordingly, comorbidity, Polypharmacy and prolonged hospital stay were found to be independent predictors of drug related problems among study participants. It was found that the likely hood of having DTPs increases as duration of hospital stay increases. Patients with the duration of hospital stay 6-10 days were about three times more likely to have DTPs [AOR=3.37, 95% CI=(1.71-6.64)] whereas those stayed more than ten days in hospital were about four times more likely to have DTPs [AOR=3.86, 95% CI:1.84-8.08] as compared to those stayed ≤5 days. It was found that patients who had polypharmacy were about three times more likely to have DTPs [AOR=3.16, 95% (CI: 1.61-6.20)] compared to those who had no polypharmacy. Similarly, patients with comorbidity were three times more likely to experience DTPs [AOR=3.39, 95% CI: (1.89-6.08)] than patients without comorbidity. Therefore, presence of comorbidity, polypharmacy and prolonged hospital stay were the predictors of drug therapy problems among pediatric patients with infectious disease in this study [**Table 9**].

Table 9: Multivariate logistic regression analysis of predictors of DTPs in pediatric ward of JUMC, 2018.

Variables	COR (95%CI)	AOR(95%CI)	P-value
Duration of hospital stay			
≤5 days	1	1	
6 to 10 days	3.70(1.98-6.94)	3.37(1.71-6.64)	0.0004*
≥11 days	4.39(2.20-8.75)	3.86(1.84-8.08)	0.0003*
Polypharmacy			
No	1	1	
Yes	4.57(2.42-8.62)	3.16(1.61-6.20)	0.001*
Comorbidity			
No	1	1	
Yes	3.92(2.29-6.74)	3.39(1.89-6.08)	0.00004*
Number of infectious disease			
1	1	1	
2	1.74(0.99-3.06)	1.19(0.61-2.32)	0.59
≥3	2.95(1.16-7.49)	1.18(0.39-3.57)	0.76
Weight(kg)			
<5	0.59(0.15-2.24)	0.66(0.15-2.84)	0.58
5-9.9	0.58(0.15-2.20)	0.82 (0.19-0.34)	0.79
10-14.9	0.46 (0.11-1.85)	0.60 (0.13-2.68)	0.50
15-19.9	0.75(0.15-3.62)	0.82(0.14-4.61)	0.82
20-24.9	*1*	1	
≥25	0.27(.06-1.13)	0.33 (0.33-1.56)	0.16
Number of disease condition			
1	1	1	
2	2.68(1.30-5.51)	0.95(0.30-2.99)	0.93
3	4.35(2.01- 9.40)	0.72(0.14-3.54)	0.69
≥4	6.67(2.79-15.92)	0.75(1.12-4.44)	0.75

6. Discussion

Study of potential drug therapy problem in pediatric patients is very essential in the prevention of complications arising from drug therapy problem (55). The prevalence and nature of all type of drug therapy problems among pediatric patients with infectious disease in pediatrics ward of JUMC had not been studied previously. Of the children included in the study, 226(74.3%) of the them had experienced at least one drug therapy problem during their hospital stayed. This showed that DTPs were common among pediatric patients with infectious disease in the study setting.

Prevalence of DTPs among pediatric patients varies from study setting to setting. In this finding the prevalence of DTPs was found to be 74.3% ,which was higher than that of the study conducted in Hong Kong (21%), Ethiopia (31.57%) and United Kingdom and the Kingdom of Saudi Arabia (45.2%) (22, 34, 35). This difference might be due to the difference in hospital setting, difference in drug therapy problems classification used and the availability of trained prescribers and clinical pharmacists in pediatric ward.

According to our study, being male had higher percentage of DTPs than female with the odd of 11.4%. However, the difference was statistically insignificant. Other findings also reported that DTPs were more frequent in males than in female. But, it was statistically insignificant (22, 35, 42). This indicated that drug therapy problems could be occurred irrespective of the sex.

The type and cause of drug therapy problems were reported in this finding. The most common drug therapy problem identified was non-compliance (28.65%) which was comparable with study done in Cote divoire (24.1%) (45). The reason may be due to majority of the patients were prescribed with multiple drugs that contributed for not to afford & difficulty in understand the instructions of drugs. Moreover, the caregiver might had less knowledge of drug use.

In the present study (27.52%) of the DTPs was found to be dose too low. This was in line with a study done in London (21.7%), Canada (19%) and Egypt (21.09%) (25, 29, 42). Dose too high was found to be (10.95%) in the present study which was lower than the study done in Hong Kong 19.3% (22).

This showed that inappropriate doses are more common in pediatrics which might be because of weight-based dose calculation, fractional dosing and incorrect recording of patients' weights and prescribing error (60).

ADRs are one of the major causes of iatrogenic disease, and they are as old as medicine itself. Pediatric patients may experience specific adverse effects not suffered by adults; thus pediatric patients are susceptible population to adverse drug reactions (61). Overall, incidence of patients experiencing ADR in this study was found to be 2.81% which was in line with the finding reported by Rashed et al (22) and study done in Toronto(2.5%) (54). The most common adverse drug reaction experienced by patients was maculopapular rash due to antibiotics such as clotrimazole and ceftriaxone. The rare adverse event such as Redman's syndrome was also reported in this finding after concomitant use of Vancomycine and ciprofloxacin. This showed that drug-drug interaction is a major factor that might cause ADR which harm patients (62).

In this study need additional drug therapy was (11.24%) which was in agreement with study done in British (9.9%) (42). In our study unnecessary drug therapy was 7.3% which was in line with study done in Addis Ababa (35). However, this finding was two times higher than study done in United Kingdom and Saudi Arabia (3.8%) (34).This indicated that duplicate drug therapy was common in study area that contributes for the patient to pay extra cost and expose them for potential ADR and drug interaction. Therefore, Prevention of duplicate drug therapy will contribute in cost saving among hospitalized patients.

The class of drugs most frequently involved in drug therapy problems was anti-infective 76.12%; which was similar with the finding reported by Rashed et al(22), Deepishka P et al (41) and Ermindo R et al(19) where systemic anti-infective were the most frequent drugs involved in DRPs. In this finding, the drugs frequently involved in DTPs were gentamicin and ampicillin. It was in contrast to study done in United Kingdom and Saudi Arabia the whereas Amoxacillin and cimetidine were the most frequent drug involved in DTPs (34). The difference might be due to these drugs were the first line drugs for infectious disease such as meningitis, pneumonia and sepsis that were prevalent in the study setting. Furthermore, these drugs were frequently prescribed than others drugs in the study setting.

The result of bivariate logistic regression analysis of independent variables and drug therapy problem showed that comorbidity, polypharmacy, number of infectious disease, type of admission, number of disease condition and length of hospital stay were associated with drug therapy problem. However, in multivariate analysis, comorbidity, length of hospital stay and polypharmacy were found to be independent predictors of drug therapy problem among pediatric patients diagnosed with infectious disease admitted to JUMC. Similarly, study done in Zewditu hospital (35), Hong Kong (22) and United Kingdom and Saudi Arabia(34) indicated that polypharmacy was the predictors of DTPs in pediatrics. This might be due to the fact that the more the number of drugs prescribed, the more drug-drug interaction, more ADR and the more medication error. Moreover, it could also increase the medication cost on patients which contribute to non-adherence that inturn increase DTP.

In this finding prolonged hospital stay was the predictor of DTPs. Similarly, the finding reported by Eshetie et al (36) and Dedefo et al (47) supported that prolonged hospital stay was the risk factor for the occurrence of DTP. The possible reason could be the more the patient stayed in hospital, the more likely the patient had chance to acquire new infection such as hospital acquired infection and health care associated infection. These infectious disease need new and more complex medications which further contribute for occurrence of drug therapy problem. Beside to this, most of the study participants had prolonged hospital stay,comorbidity and they had been prescribed with the average of four drugs per patients which increased likely hood of experiencing DTPs in the study patients

In the current study, presence of comorbidity was one of independent predictors for DTP. This was also supported by the finding reported by Zed et al (29). The reason might be presence of comorbidity influence the desired outcome of other disease by increasing number of drugs, causing disease-disease interaction, drug-drug interaction, drug-disease interaction which collectively result in increased likely hood of experiencing DTPs in the study patients.

Clinical pharmacist involvement in inpatient pediatric care can significantly help to identify, resolve and prevent the drug therapy problems (54). In this finding the most common type of interventions provided was change of the medication (25%) which was similar with study done in India (55). However, it was higher than that of study done in Tirupathi (6%) (41).

This discrepancy might be due to ineffective drug therapy, which need changing of the medication, was not assessed in the finding reported from Tirupathi. Adherence and counseling (22.19%) provided for patients was higher than finding reported by Rashed et al (22). The discrepancy might be due to dosing problem was the most common type of DTP whereas non-compliance was most common DTP in this finding.

In the present study majority of intervention provided were accepted (79.49%);which was in line with study done in Toronto(81%) (54). This showed that DTPs can be prevented through effective communications and collaboration among clinical pharmacists, physicians, nurses and as well as patients (63)

LIMITATION OF THE STUDY

- Since the study was conducted in single center, it may lack external validity.
- The study did not classify DTPs in its severity level that means mild, moderate and severe due to the complexity of the study

7. Conclusions

The present finding showed that the prevalence of drug-related problems were high at pediatric ward of Jimma University medical center that needs great attention. The most frequently identified DTPs were non-compliance, followed by dose too low and ineffective drug therapy. The finding revealed that presence of comorbidity, poly-pharmacy and prolonged hospital stays were independent predictors of DTPs. From overall interventions provided, change of medications, adherence and counseling and change in drug dose were the common. The acceptance rate of recommendation by clinical pharmacist was high.

8. Recommendations

The prevalence of drug therapy problems were found to be high. Therefore, the following recommendations are forwarded based on the result of the study.

For Jimma university medical center

- Clinical pharmacists have be recruited and assigned to pediatric ward of Jimma university medical center in order to provide better pharmaceutical care services.
- The hospital have to establish the forum that encourage physicians , nurses and pharmacist relationship for better pharmaceutical services
- Medication education program for caregiver/family have to be established in the hospital

For health professionals who work in Pediatric ward of JUMC

- **Pediatrians**
  - Consult clinical pharmacists for complicated cases with complex medications regimen for better outcome
  - Follow the recommended guidelines while prescribing the drug frequency and drug dose.
- **Nurses**
  - Check and calculate the correct drug dose while administer the drug for the patients
  - Consult pharmacist for any confusion about drug before administering the drug for the patients

For Department of clinical pharmacy

Pediatrics are special population whom their medical management required special attention. Therefore, health care professionals who have deep knowledge of pediatric pharmacotherapy are needed.

So that department of clinical pharmacy should:

- Establish physicians and clinical pharmacists scientific presentation session on pediatrics pharmacotherapy regularly
- Provide training on antibiotics related problem, medication administration technique for health professional working in pediatrics ward of JUMC.
- Establish antibiotic stepwardship program

For patients/caregiver

- Take/give his/her medicine as prescribed if you have forgeton the instructions how to provide the drugs, ask pharmacist or health professional before providing for the patients

For federal ministry of health /policy maker

- Recruit clinical pharmacist in pediatric ward of different hospital.
- Have to strengthen the reporting and monitoring mechanism of drug therapy problem

For researchers

- Conduct a research on clinical, economical and humanistic impact of drug therapy problem among pediatric patients with infectious disease admitted to the study area.

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Annex I: Patient information sheet

Name of investigators: Desalegn Feyissa

Advisor: Dula Dessalegn [B.pharm, Msc in clinical pharmacy]

Name of study area: Pediatrics ward of Jimma university medical center, Jimma, South west Ethiopia.

Research budget covered by: Jimma University

Research objective: To Assess drug therapy problem and its contributing factors among patients admitted to pediatric ward with infectious disease and other comorbidities in JUMC, from April 1 to June 30, 2018

Study procedure: Initially patient chart's was reviewed for inclusion and exclusion criteria at time of admission. The data collectors extracted data from patient chart and interview patients' /caregivers using questionnaires after obtaining consent from the patients' care giver.

Risks: That the result of this study would have no any harmful effects on study participants in any directions

Participant role: volunteerism and helping in providing information to the data collectors during the interview.

Participant's right: Taking part in this study is completely voluntary. It is parents' choice whether their children to participate or not. You have no objections to our accessing any records and interviewing you about your child .You may skip any questions that you do not want to answer.

Beneficial: Since identifying drug therapy problems and providing on spot intervention is the main objective of the study, the study participants were benefited from the finding.

Incentives: The study participants were not provided any incentive.

Confidentiality: Any information of patient's taken from their parents and medical records would be completely confidential and the data are stored without their name and only used for the purpose of this study.

Agreement: Patients' caregivers are expected to be fully voluntary to participate in the study

Contact: I you have any kind of inconveniencies about the study, you can contact:

Desalegn Feyissa (principal investigator)

Telephone: +251917127556

sinaawayya@gmail.com

ANEX II: Patient Written informed Consent Form

Dear/ Sir/Madam,

My name is Desalegn Feyissa; I am year II post graduate clinical pharmacy student at Jimma University. I am going to do a research on Drug therapy problems and its contributing factors among pediatrics patients with infectious disease admitted to Jimma University medical center. Therefore, for the success of this research your child's medical chart and your response to interview are paramount. Any information of your child's from you and medical records would be completely confidential to the research and the data are stored without his/her name and only used for the purpose of this study. None of this would affect the care your Childs' receive from JUMC, rather it will contributes in managing your Childs' medical problem and also help in future planning for the hospital care. No identifying names or characteristics will go into my report, so you may share your thoughts openly about your child's.

Additionally, taking part in this study is completely needs voluntary. It is your choice whether to participate or not. You may skip any questions that you do not want to answer. Please ask me to stop as we go through the information and I will take time to explain. I would be grateful if you could sign the attached form to say you have no objections to our accessing any records and interviewing you about your child. Would you be willing to assist me by having a 15-20 minutes' interview with me? Interview accepted; Yes…… No……..

If the interviewee responds "Yes" please proceed and let him/her to sign or if replies "No" gratitude him/her and quit the interview. If you have any questions concerning the study, please call Desalegn Feyissa (PI) (+251) 917-12 7556.

Signature of interviewer_____

Signature of respondent _____

Date: _____ (Day/month/year)

Principal Investigator: Desalegn Feyissa

Jimma University, IHS, School of Pharmacy, Department of Clinical Pharmacy

Email: sinaawayya@gmail.com

ANEX III: DATA COLLECTION TOOL

JIMMA UNIVERSITY

INSTITUTE OF HEALTH

SCHOOL OF PHARMACY

DEPARTMENT OF CLINICAL PHARMACY

Data collection format for research paper entitled with "Drug therapy problem and its contributing factors among pediatrics patients with infectious disease admitted to Jimma university medical center from April 1,2018 to June 30,2018, Jimma, South west Ethiopia".

Part I. Patient Socio-demographic characteristics

Age____ Card no_____ Height (cm) _____Body surface area (BSA) _____

Sex____ Weight (kg) _____ Place of residence: Urban_____ Rural_____

Part II: Patient clinical information:

2.1 Is any pre admission diagnosis? Yes___ No____

2.2 If yes for question number 2.1 list those diagnosis

a) _____ c)_____

b) _____ d)_____

2.3 Diagnosis(infectious disease(ICD)_____

Date	diagnosis

2.4 Is there any comorbidity condition? Yes…….. No……

2.5 If yes to question number 2.4 list comorbidities identified

a) _____ c)_____

b) _____ d)_____

2.6 Duration of hospital stays_____

2.7 Type of admission: New_____ Transferred_____

2.8 Review of system and Patient's laboratory result starting from date of admission to discharge

Signs, Symptoms, Lab values	List only deviation from normal (and relevant baseline values)										Remark
Date											
VITAL SIGNS:											
Temp											
BP											
RR											
HR											
CNS/NEUROLOGIC CSF											
HEENT											
CVD and Respiratory											
Troponin I											
Gene expert											
FLUID & ELECTROLYTE											
Na+											
K+											
Ca++											
Cl-											
RFT											
Sr creatinine											
BUN											
Cr cl											
LFT											
AST											
ALT											

ALP											
Albumin											
GU/REPRODUCTION											
Urine Analysis											
ENDOCRINE											
Glucose											
Musculoskeletal system											
HEMATOLOGY											
WBC											
RBC											
Neutrophils											
Lymphocyte											
Hgb											
MCV											
Platelets											
INR/PT											
Culture (if available)											

Part III. Patients' medication information

1. Did your Childs' take any medication before admission to this hospital? Yes___ No____
2. If yes for question number 3.1 list those medication
    a) _____ e)_____
    b) _____ f)_____
    c) _____ g)_____
3. Medication given for patients' from date of admission to discharge

Drug Name/strength/dose/route	Prescribed schedule	Duration Start date-stop date	Indication	Remark

4 Number of drugs prescribed per patient:_____

Part IV. Drug therapy problem identified

I. Logical questions to identify whether or not the patient is experiencing a drug therapy problem

1. Is there a need for additional drug therapy? Yes___ No____
2. If yes for no.1 what is the reason for additional therapy need?
    a) A medical condition requires the initiation of drug therapy.
    b) Preventive drug therapy is required to reduce the risk of developing a new condition.
    c) To attain synergistic effect or additive effect
    d) Others (specify)_____

3. If " yes" for number,1 please list those medical problems needing additional medication

Date	Indication	Drug regimen with the problem	cause

4. Is there any unnecessary drug therapy for the patient? Yes___ No____
5. If yes for number.4 what are the reasons for unnecessary drug therapy?
    a) There is no valid medical indication for the drug therapy at this time.
    b) Multiple drug products are being used for a condition that requires single drug therapy.
    c) The medical condition is more appropriately treated with non-drug therapy.
    d) Drug therapy is being taken to treat an avoidable adverse reaction associated with another medication.
    e) Only life style can be used to control a medication
    f) Other specify ____
6. If " yes" for number,4 please list those unnecessary prescribed medication and causes

Date	Indication	Drug regimen with the problem	cause

7. Is there any ineffective drug therapy used? Yes___ No____
8. If yes for number.7. What was the cause?
    a) The drug is not the most effective for the medical problem.
    b) The medical condition is refractory to the drug product.
    c) The dosage form of the drug product is inappropriate.
    d) The drug product is not an effective product for the indication being treated
    e) Others (specify)_____
9. If yes for number 7 list the ineffective medication used?

Date	Indication	Drug regimen with the problem	cause

10. Is there any medication with too low dosage? Yes___ No____
11. If yes for number.10. What was the cause for the dosage too low?

a) The dose is too low to produce the desired response.
b) The dosage interval is too infrequent to produce the desired response.
c) A drug interaction reduces the amount of active drug available.
d) The duration of drug therapy is too short to produce the desired response.
e) Other (specify)____

12. If yes for number 10 list those doses too low with their causes?

Date	Indication	Drug regimen with the problem	cause

13. Is there any medication with too high dosage? Yes___ No____
14. If Yes for question number.13 what is the cause for dosage to be high?
    a) Dose is too high.
    b) The dosing frequency is too short.
    c) The duration of drug therapy is long for a given condition.
    d) A drug interaction occurs resulting in a toxic reaction to the drug product.
    e) The dose of the drug was administered too rapidly
    f) Adjustment for renal impairment was not done
15. If yes for question number 13 .please list those with dose too high with their causes

Date	Indication	Drug regimen with the problem	cause

16. Is there any adverse drug reaction? Yes__ No____
17. If "yes" for number 16 what was the cause for the ADR?
    a) The drug product causes an undesirable reaction that is not dose-related.
    b) A safer drug product is required due to risk factors.
    c) A drug interaction causes an undesirable reaction that is not dose-related.
    d) The drug product causes an allergic reaction.
    e) The drug product is contraindicated due to risk factors
    f) Other (specify)____
18. If yes for question no 16 .please list those with ADR with their causes

Date	Indication	Drug regimen with the problem	cause

19. Is there any compliance problem? Yes__ No____
20. If "yes" for number 19 what was the cause for the non-compliance?
    a) The patient/caregiver does not understand the instructions.
    b) The patient/caregiver prefers not to take/give the medication.
    c) The patient/caregiver forgets to take/give the medication.
    d) The drug product is too expensive for the patient.
    e) The patient cannot swallow the drug product.
    f) The drug product is not available for the patient.
21. If yes for question number 19 .please list those drugs for which the patient non-compliant with its causes?

Date	Indication	Drug regimen with the problem	cause

Part V Medication error

Logical questions to identify whether or not the patient is experiencing medication error. If medication error occurred, tick on one of the following option provided under each type of medication error.

1. Is there any medication error? yes ___ no__
2. If yes for question no 1 what type of error occurred?
    a) Prescribing error
    b) Dispensing error
    c) Administration error
    d) Other (specify)_____
3. If option "a" is the answer for question no 2 what is the cause?
    a) Wrong medication prescribed
    b) Wrong dosing prescribed
    c) Wrong route prescribed
    d) Wrong frequency prescribed
    e) Others (specify)____

4. If option "b" is the answer for question no 2 what is the cause?
    a) Wrong drug is dispensed
    b) Wrong strength is dispensed
    c) Wrong dosage form is dispensed
    d) Others(specify)
5. If option "c" is the answer for question no 2, what is the cause?
    a) Wrong frequency
    b) Omission: no administration of a drug
    c) Wrong dosing: total or single dose
    f) Wrong delivery route
    e) Other(specify)____

Part VI: Drugs involved in drug related problem

- Among the prescribed drugs specify which class and drug involved in drug related problem.

Date	Class of drug involved in DTP	Specific drug involved in DTP	comment

Part VII: Intervention taken by pharmacist and its outcome

1. Type of intervention given
    a) Addition of the drug_____
    b) Adherence and counseling _____
    c) Formulation changed _____
    d) Cessation of medication_____
    e) Change in drug dose_____
    f) Change of medication _____
    g) other(specify)_____

2. Status of recommendation:
    a) Intervention accepted_____
    b) Intervention accepted with modification_____
    c) Refused_____

3. Intervention respondents
    3.1 Physicians
        3.1.1 Seniors
        3.1.2 Residents
        3.1.3 Interns
    3.2 Nurses ____
    3.3 Family/caregiver_____

PLEASE! Fill the following information.

1. Name of data collector…… Signature……Date……..
2. Name of Supervisor ……... Signature…… Date……..

Annex IV: Category and common cause of Drug therapy problem

Need additional drug therapy

- A medical condition requires the initiation of drug therapy.
- Preventive drug therapy is required to reduce the risk of developing a new condition.
- A medical condition requires additional pharmacotherapy to attain synergistic effects

Unnecessary drug therapy

- There is no valid medical indication for the drug therapy at this time.
- Multiple drug products are being used for a condition that requires single drug therapy.
- The medical condition is more appropriately treated with non-drug therapy.
- Drug therapy is being taken to treat an avoidable adverse reaction associated with another medication.

Ineffective drug therapy

- The drug is not the most effective for the medical problem.
- The medical condition is refractory to the drug product.
- The dosage form of the drug product is inappropriate.
- The drug product is not an effective product for the indication being treated

Dosage too low

- The dose is too low to produce the desired response.
- The dosage interval is too infrequent to produce the desired response.
- A drug interaction reduces the amount of active drug available.
- The duration of drug therapy is too short to produce the desired response**.**

Adverse drug reaction

- The drug product causes an undesirable reaction that is not dose-related.
- A safer drug product is required due to risk factors.
- A drug interaction causes an undesirable reaction that is not dose-related.
- The dosage regimen was administered or changed too rapidly.
- The drug product causes an allergic reaction.

- The drug product is contraindicated due to risk factors

Dosage too high

- Dose is too high.
- The dosing frequency is too short.
- The duration of drug therapy is too long.
- A drug interaction occurs resulting in a toxic reaction to the drug product.
- The dose of the drug was administered too rapidly.

Noncompliance

- The patient/caregiver does not understand the instructions.
- The patient/caregiver prefers not to take/give the medication.
- The patient/caregiver forgets to take/give the medication.
- The drug product is too expensive for the patient.
- The patient cannot swallow or self-administer the drug product appropriately.
- The drug product is not available for the patient

Prescription Errors

- Wrong medication (contraindicated for the patient or belongs to another)
- Wrong dosing: total daily dose or charge and maintenance; includes errors such as using milligrams (mg) instead of micrograms
- Wrong route of administration
- Error in dosing interval

Administration Errors

- Wrong frequency (30 minutes before or 1 hour after the prescribed time)
- Wrong administration (wrong drug or wrong patient)
- Wrong delivery route
- Omission: no administration of a drug
- Wrong dosing: total or single dose
- Error in dilution
- Wrong infusion rate

Dispensing Errors

- Wrong drug dispensed
- Wrong strength dispensed
- Wrong quantity dispensed
- Wrong dosage form dispensed
- Expired drug dispensed

Data collection format in Afan Oromo version

Guca waliigaltee Afaan oromootin

Kabajamaa/ttuu Haadha/Abbaa hirmaataa/ttuu qorannoo kanaa. Ani Dassaalany Fayyissa yunivarsiitii Jimmaatti barataa kiliinikaal faarmaasii waggaa lammaffaa yoon ta'u, yeroo ammaa kana qorannoo waa'ee rakkoolee yaala qorichaan walqabatan giddu gala yaala fayyaa yunivarsiitii jimmaa kutaa daa'iman ciisanii yaalamanii keessa jiru irratti gaggeesufan jira. Kanaafuu galma gahiinsa qorannoo kanaatif deebiin afanii isin waa'ee yaala mucaa keesssanii naaf kennitan fi odeeffannoon kaardii yaala mucaa keessanii irra jiru baay'ee barbaachisaadha. Odeeffanoon isinirraa argamu maqaas ta'ee mallattoo eenyummaa mucaa keessanii kan hin qabnee fi iccitiidhan kan qabamudha. Hirmaachuu yookiin hirmaachuu dhabuun mucaa keessanii yaala fayyaa argatu/ttu irratti dhiibbaa hin qabu. Garuu, mucaan keessan furmaata rakkoolee mul'ateef kennamu irraa ni fayyadama/tti. Akkasumas qulqullina yaalaa gara fulduraatti hospitaalichaan kennamu foyyesuuf ni fayyada. Kanaafuu yaada keessan iftoominaan akka naaf laattan aferamtaniirtu.

Dabalataanis hirmaannaan kun guutumaan guututti fedhii iratti kan hundaa'eedha. Gaaffii deebisu hin barbaanne yoo jiraate, irra darbuu yookiin gaafachuu ni dandeessu. Yoo hirmaachuuf eeyyamamaa taatan guca kanarratti mallatteesun mirkaneessaa. **Eeyyee … lakki……..** yoo gaafii qabaatan bilbila kanaan naaf bilbilaa. Dassaalany Fayyissa (+251917127556).

Mallattoo gaafataa_____

Mallattoo deebii kennaa_____

Guyyaa_____(guyyaa/ji'a/bara)

Dassaalany Fayyisaa

Jimma University, IHS, School of Pharmacy, Department of Clinical Pharmacy

Email: sinaawayya@gmail.com

Kutaa 1ffaa. Odeeffannoo jireenya hawaassummaa fi eeyyummaa Dhukkubsataa

Umrii_____Lakk Kaardii_____ dheerina(cm)_____ Bali'ina qaamaa_____

Saala_____ Ulfaatina(kg)_____ Bakka jireenyaa: Magaalaa____ Baaddiyaa_____

Kutaa 2ffaa . Odeeffannoo haala dhukkuba dhukkubsataa/ttuu

2.1 Qorannoon yaalaa utuu hospitaala kana hinciisin duraa jiraa? Eeyye__ lakki___

2.2 Deebiin gaaffii 2.1"eeyyee" yoo ta'ee dhibee maalii dhukkubsatee/ttee tarreessi.

a) _____ c) _____

b) _____ d)_____

2.3 Bu.aa qorannoo yaalaa _____

guyyaa	Qorannoo yaalaa(organizimootan dadarban)

2.4 Dhukkubni dabalataa kan biraa ni jiraa? Eeyyee____ Lakki_____

2.5 Deebiin gaafii 2.4 yoo "eeyye ta'e" maqaa isaanii tarreessi____

a) _____ c)_____

b) _____ d)_____

2.6 Turtiin hospitaala keessa ture/turte(guyyya dhan)_____

2.7 Gosa ittiin ciise: Haaraa____ Rifariidhan_____

Kutaa 3ffaa Odeeffannoo waa'ee qoricha dhukkubsataa

3.1.Otuu hospitaala kana hin ciisin (dhufin) dura dawaan fudhate/ttee jiraa? Eeyye ____ lakki___

3.2. Deebiin gaaffii lakk 3.1 " eeyyee" yoo ta'e eeyyu akka ta'e tarressi.

a) _____

b) _____

c) _____

d) _____

3.3 Qorichoota guyyaa jalqabaa hamma dhumaatti dhukkubsataaf kenname

Maqaa/hamma/karaa qorichi ittiin fudhatamu	Guyyaatti si'a meeqa fudhata/tti	Guyyaa meeqaaf fudhata/tti	Dhibee ajajameef	hub

3.4 Baay'ina qorichoota dhukkubsataan waliigalitti fudhate/tte_____

Kutaa 4ffaa: Rakkolee yaala qorichaan walqabate

I. Gaaffilee lojikaawaa rakkolee yaala qorichaan walqabate dhukkubsataa mudate agarsiisu.

1. Qorichi dabalataa ni barbaachiisaa? Eeyyee __ lakki___
2. Deebiin gaaffii lakk 1 "eeyyee" yoo ta'e sababni isaa maali?
    a) Haalli dhibichaa qoricha egalsiisuu barbaada
    b) Dhibeen haaraan akka hin uumamneef qoricha ittaasaf ta'utu barbachisa
    c) Qoricha biroo waliin akka walgargaruuf/ bu'aa dabalataa akka fiduuf
    d) Kan biraa(adda baasi)_____
3. Deebiin gaaffii lakk 1ffaa "eeyyee" yoo ta'e qorichoota dabalamuu barbachisan tarressi

Guyyaa	dhibee kennamuuf	Qorichaa dabalataa barbaachisu	Sababa kennamuuf

4. Qorichi dhukkubsataa/ttuu kanaaf hin barbaachisne jiraa? Eyyee___ lakki___
5. Deebiin gaaffii lakk 4ffaa "eeyyee" yoo ta'e sababni qorichi hin barbaachifneef maali?
    a) Dhibeen ammaf akka ajajamu godhu waan hin jirref

b) Qorichi tokko utuu gaha ta'ee jiruu, Dhibichaf qorichoota baay'etu kennamaa jira
c) Dhibicha yaaluuf yaala qorichaan alaatu barbachisa
d) Miidhaa qorichaa kan ofiin baduu danda'uuf qorichi ajajame
e) Haala jireenyaa foyyeesun qofaan dhibee to'achuuf gahadha
f) Kan biraa(adda baasii)___

6. Deebiin gaaffii lakk 4ffaa "eeyyee" yoo ta'e qorichoota hin barbaachifne fi sababa isaanii tarressi

Guyyaa	dhibee kennameef	Qoricha hin barbachisne	Sababa

7. Yaalli qorichaa gahaa kan hin taane jiraa? Eeyyee __ Lakki____
8. Deebiin gaaffii lakk 7ffaa "eeyyee" yoo ta'e sababni qorichi gahaa hin taaneef maali?
    a) Yaalli qorichaa dhibicha yaaluuf caalatti gahaa miti
    b) Dhibichi qoricha kanaan waan dideef
    c) Gosa qorichi ittiin qopha'ee gahaa miti
    d) Qorichi kun dhibee kana yaaluuf gahaa miti
    e) Kan biraa(adda baasi)_____
9. Deebiin gaaffii lakk 7ffaa "eeyyee" yoo ta'e qorichi gahaa hin taane sababa isaa wajjin tarreessi?

Guyyaa	dhibee kennameef	Qoricha gahaa hin taane	Sababa

10. Hammi(doozii) qorichaa kan dhukkubsataaf kennamu kan xiqqaate jiraa? Eyyee lakki____
11. Deebiin gaaffii lakk 10ffaa "eeyyee" yoo ta'e sababni isaa maali?
    a) kaayyoo barbadamu argachuuf hammi qorichaa xinnaadha
    b) Si'a qorichi fudhatamu guyyatti xiqqaadha
    c) Dhibbaan/hariiron qorichi qoricha biraa waliin qabu hamma isa xiqqeesse
    d) Qorichi guyyaa gababaadhaaf fudhatame

12. Deebiin gaaffii lakk 10ffaa "eeyyee" yoo ta'e qorichi hammi isaa xiqqaate fi sababa isaa tarreessi?

Guyyaa	dhibee kennameef	Qoricha hammi isaa xiqqate	Sababa

13. Hammi qorichaa kan guddate jiraa? Eeyyee __ lakki___
14. Deebiin gaaffii lakk 13ffaa "eeyyee" yoo ta'e sababni isaa maali?
    a) Hamma isaatu guddate
    b) Daanga [interval] qorichi guyyaatti kennamu gabaabachuu
    c) Guyyoonii qorichi kennamef waan dheratef
    d) Dhiibbaan qorichi fi qorichi wal irratti qabu hamma qorichaa waan guddiseef
    e) Hammi qorichaa aritiidhaan waan kennameef
    f) Hammi qorichaa nama dhukkuba kale qabuuf waan hin sirrannef
15. Deebiin gaaffii lakk 13ffaa "eeyyee" yoo ta'e qorichi hammi isaa guddate fi sababa isaa tarreessi?

Guyyaa	dhibee kennameef	Qoricha hammi isaa guddate	sababa

16. Qorichi miidhaa fide jiraa? Eeyye __ lakki___
17. Deebiin gaaffii lakk 16ffaa "eeyyee" yoo ta'e sababni isaa maali?
    a) Qorichi miidhaa hammaan wal hin qabanne fide
    b) Waantonni miidhaa qorichaa akka hammatu taasisan waan jiraniif qorichi nageenyi isaa gaariitu barbachisa
    c) Dhiibban qorichi qoricharratti qabu miidhaa qorichaa kan hammaa wal hin qabanne fide
    d) Qorichi alarjii fidde
    e) Dhibee kanaaf qorichi kun gonkumaa hin kennamu
    f) Kan biraa(adda baasi)____

18. Deebiin gaaffii lakk 16ffaa "eeyyee" yoo ta'e qorichi miidhaa fidee fi sababa isaa tarreessi?

Guyyaa	dhibee kennameef	Qoricha miidhaa fide	sababa

19. Qoricha fudhachuu irratti rakkoon jiraa? Eeyyee__ lakki____
20. Deebiin Gaaffii lakk 19ffaa "eeyyee" yoo ta'e sababni isaa maali?
    a) Dhukkubsataan qajeelfama qorichaa hin hubanne
    b) Dhukkubsataan qoricha fudhachuu dhiisuu filate
    c) Dhukkubsataan qoricha fudhachuu hirranfate
    d) Dhkukubsataan qoricha liqimsuu hin danda'u/ttu
    e) Qorichi waan hin argamneef
    f) Dhukubsataan qoricha bitachuu waan hin dandeenyeef____
21. Deebiin Gaaffii lakk 19ffaa "eeyyee" yoo ta'e qorichi dhukkubsataan seeran hin fudhanne qabu fi sababa isaa tarreessi?

Guyyaa	dhibee kennameef	Qoricha seeran hin fudhatamne	sababa

4 Dogoggora qorichaa

Gaaffii lojikalawaa dogoggori qorichaa jiraachuu fi dhiisuu isaa ittin adda baasnu. Dogoggorri yoo jiraate fuldura isaatti mallattoo"√" galchi.

4.1 Doggogorri qorichaa jiraa ? eeyye ___ lakki___

4.2 Deebiin gaaffii 1 ffaa "eeyyee " yoo ta'e gosa dogoggoraa kamtuu uumame?

a) Dogoggora ajajuu
b) Dogoggora qorichaa faarmaasii biraa kennamu
c) Dogoggora qoricha yeroo kennamuu
d) Kan biraa(adda baasii)_____

4.3 Filannoon "a " deebii yoo ta,e sababni isaa?

a) Qoricha dogoggoraatu ajajame
b) Hamma dogoggoraatu ajajame
c) Karaa qorichi ittiin fudhatamu dogoggora

d) Si'a qorichi fudhatamu dogoggora

e) Kan biraa (adda baasi)____

4.4 Filannoon "b " deebii yoo ta,e sababni isaa maalii ?

a) Qoricha dogoggoraatu faarmaasiirra kenname

b) Ciminni(strength) qorichaa dogoggoraatu faarmaasiirra kenname

c) Bifa qorichi ittiin qophaa'e dogoggoraatu faarmaasiirra kenname

d) Kan biraa (adda baasi)_____

4.5 Filannoon "c " deebii yoo ta,e sababni isaa maali?

a) Dogoggora deddebii

b) Karaan qorichi fudhatamu dogoggora

c) Qoricha kennuu dhiisuu

d) Hammi kenname dogoggora e) kan biraa (adda baasi)___

Kutaa 4ffaa: Qorichoota rakkoon yaala qorichaa irratti rawatame

Guyyaa	Garee qorichaa kan dogoggorr irratti argame	Qoricha rakkoon yaala qorichaa irratt raawwatame	yaada

Kutaa 5ffaa: Tarkanfii(furmaata) ogeessa farmasiitin kennamee fi bu'aa isaa

1. Gosa fala furmaataa kenname
   a) Dabalata qorichaa_____ e). Qorichaa jijjiruu_____
   b) Gorsaa fi madaksa qorichaa_____ f) Hamma qorichaa jijjiruu_____
   c) Bifa qorichaa jijjiruu_____ g) Kan biraa(adda baasi)_____
   d) Qorichaa dhabsisuu_____
2. Sadarkaa fala furmaataa kennamee
   a) Guutummatti fudhatama argate___ c) Fudhatama hin arganne_____
   b) Walakaadhan furmaatta argate___
3. Fala furmataaf kan deebii kennan
   3.1 Hakimoota
   3.2 Narsoota
   3.3 Warra dhukkubsataa_____

Data collection format in Amharic version

የስምምነት ቅጽ

ጤና ይስጥልኝ? ስሜ ደሳለኝ ፈይሳ ይበላለሁኝ: የጅማ ዩኒቨሲቲ የሁለተኛ ዓመት የክሊኒካል ፈርማሲ ተማሪ ስሆን: በአሁኑ ሳዓት ከህክሚና መዳሃኒት ጋር የተያየዘ የሚመጡ ችግሮች በህፃነት ክፍል እየሰረዉ ይገኘለሁኝ። ስለዝህ ለዚህ ጥናት ስኬት ደግሞ የቃል ጥያቄ ስለ ልጃቸው ህክሚና የምትሰጡንነ ና በልጃቸው የህክሚና ካርድ ለይ የለዉ መረጀ እጅግ አስፈላጊ ነው። በዚህ ጥናት ዉስጥ ልጃቸዉ ማሰተፍ በልጀቸዉ ህክምና ለይ የምያመጣ አንድም ችግር የለም። ነገር ግን ለተፈጠረዉ ችግረ ለይ የምሰጠዉ መፍተሄ ተጠቃሚ ልሆን ይችላል/ትችላለች። የምትሰጡን መረጀ ስምም ሆነ የልጀቸዉ መንነት እይዝም/አያከቲትም: እንድሁም በምስጥር የምየዝ ይሆናል።

መሳተፍና አለመሰተፍ ልጀቸዉ ከምያገኘዉ ህክምና ላይ ምንም አይነት ጫና የለም: ነገር ግን ለወደፍት በ ሆስትታሉ የምሰጥ የህክምነ ጥራት የላቀ እንድሆን ለግበዓት ይሆናል። ስለዚህ ሀሳበችሁን በግልፅነት እንድትሰጡን ተጋብዛጀል። በተጨማሪም ተሳትፈችሁ ሙሉ በሙሉ ፍላጎት ላይ የተመሰረተ ነዉ: መመለስ የማትፈልጉ ጥያቄ ካለ መዝለል ወይም ደግሞ መጠየቅ ትችላለችዉ። ለመሳተፍ ፍቃደኛ ከሆኑት ቀጥለዉ በለዉ ቅፅ ላይ በፍርማ የረጋግጡልን።

ስለ ጥናቱ ጥይቄ ካለዎት ነጻ ሆነው ጠይቁኝ ጥናቱን የሚያጠናውን ሰው ከፈለጉ ከዚህ በታች ባሉት አድራሻዎእ ማግኘት ይችላሉ፡

የተሳታፊዉ ፊርማ፡ _____

የመረጃሰብሳቢፊርማ፡ _____

የዋናዉተመራማሪመረጃ፡-

ስም፡ ደሳለኝ ፈይሳ

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ክፍል ነ : የተማሚዉ መረጀ

ዕድሜ----------ካርድ ቁጥር---------- ቁመት----------የሰዉነት ሲፋት----------

ዖታ----------ክብደት--ከጂ----------የመኖራ ቦታ-ከተማ----------ገጠር----------

<u>ክፍል 2: የተማሚዉ በሽታ ሁኔታ</u>

2.1 ከዚህ በፍት ላሞት ያቃል? አዎ---------አይደለም----------

2.2 በተራ ቁጥር 2.1 መልሶት አዎ ከሆነ ምንአይነት በሽታ አሞት ያቃል?

ሀ.---------- ለ.---------- ሐ.---------- መ.----------

2.3. አሄ ሆስፕታል ከመታኛት በፊት መደሃኒት ወስዶ ያቃሉ? አዎ---------አይደለም----------

2.4. በተራ ቁጥር 2.3 መልሶት አዎ ከሆነ በዝርዝሩ ምን ምን ነቸዉ?

ሀ.---------- ለ.---------- ሐ.---------- መ.----------

2.5 የህክሚና ምርመራ- ----------

ሀ. የሳንባ በሽታ ለ. የመጀመሪያ ሴፕሲስ/የደም/የትሹ እንፌክሽን ሐ. ቀጠይ ሴፕሲ መ. ማጅራት ገትር

ቀ. ዎባ በሽታ ሰ. ኤ.ች.ቭ በሽታ ረ. ሌለም ከ አለ ይጥቀሱ----------

2.6. ሌለ ተጨማሪ በሽታ ነበሮት? አዎ---------- አይደለም----------

2.7. በተራ ቁጥር 2.6 መልሶት አዎ ከሆነ ፤ ብዛቱን ይጥቀሱልን----------

2.8. በተራ ቁጥር 2.6 መልሶት አዎ ከሆነ፤ዝርዝሩን ያስቀምጡት------

ሀ.---------- ለ.---------- ሐ.---------- መ.----------

2.9. የሆስፕታል ቆይታ በቀን ብዛት ስንት ይሆናል----------

2.10. የተኛበት በሽታ ሁኔታ: አድስ ነዉ---------- በ ሪፋራል ነዉ----------

2.11. ለተማሚዉ የተዘዛ የመደሃኒት ብዛት በቁጥር ----------

<u>ክፍል 3: ስለ ታማሚዉ መዳሃኒት መረጀ</u>

3.1. ወደ ሆስፕታሉ ከመምጣቱ በፍት የወሠዱት መዳሃኒት አላ? አዎ _____ አይደለም___

3.2. ለተራ ቁጥር 3.1 መልሰዎት " አዎ ከሆነ" ይዘርዝሩልኝ

ሀ.----------

ለ.----------

ሐ.----------

መ.----------

3.3 ከመጀመረ ቀን እስከ መጨረሻ ቀን ለህሙማን የተሠጣ መዳሃኒት

መዳሃኒት ስም/መጠን/የምሰጥበት መንገድ	የተዘዘበት ፕሮግራም	የተዘዘበት ቀን	የተዘዘበተ በሽታ

ክፍል 4፡ ከህክሚና መዳሃኒት ጋር ተያይዞ ተማሚዉን ያ ጋጠመ ችግር የምያሳይ ሎጅካል ጥያቄ

1. ተጨማሪ መዳሃኒት ያስፈልጎታል? አዎ---------- አይደለም----------
2. በተራ ቁጥር ነ ጥያቄ መልሶት አዎ ከሆነ ምክነሃቱ ምንድነዉ?

   ሀ. የበሽታዉ ሁኔታ መዳሃኒቱን መስጀመር ስለ ምፈልግ

   ለ. አድስ በሽታ እንዳይፈጠር ለመከለከያ የምሆን መዳሃኒት ያስፈልጋል

   ሐ. ከ ሌለ መዳሃኒት ጋር የተሻለ ለዉጥ እንድያመጣ

   መ. ሌለ ከላ ገለጻ ይደረግ----------

3. በተራ ቁጥር ነ ጥያቄ መልሶት አዎ ከሆነ ተጨማሪ መዳሃኒት የምፈልጉ በሽታዎች በዝርዝር ያስቀምጡ

ቀን	የተሰጠበት በሽታ አይነት	በተጨማሪ ያስፈለገዉ መዳሃኒት ዝርዝር	ምክኒያት

4. አስፍላጊ ያል ሆነ የ ህክሚና መዳሃኒት አለ? አዎ---------- አይደለም----------

5. በተራ ቁጥር 4 ጥያቄ መልሶት አዎ ከሆነ መዳሃኒቱ አስፈላጊ ያልሆነበት ምክኒያት ምንድነዉ?

   ሀ. እንድት ታዘዝ የምፈልግ በሽታ ስለ ሌላ ነዉ

   ለ. አንድ መዳሃኒት በቂ ሆኖስ ሳለ ብዙ መዳሃኒት እየተሰጣ ስለ ሆነ ነዉ

   ሐ. ከ መደሃኒት ዉጭ ሌላ ህክሚና ስለምያስፈልግ

   መ. የአኗኗር ዘይቤ በመስታካከል በሽታዉን መቆጣጠር ስለምቻል

   ሰ. ሌለ ከላ ይለዩት----------

6. በተራ ቁጥር 4 ጥያቄ መልሶት አዎ ከሆነ አለስፈላጊ የሆኑት መዳሃኒት ይዘርዝሩት

ቀን	የተሰጠበት በሽታ አይነት	አለስፈላጊ የሆነ መዳሃኒት	ምክኒያት

7. በቂ ያልሆነ የመዳሃኒት ህክሚና አለ? አዎ---------- አይደለም----------

8. በተራ ቁጥር 7 ጥያቄ መልሶት አዎ ከሆነ መዳሃኒቱ በቂ ያልሆነበት ምክኒያት ምንድነዉ?

ሀ. በሽታዉን ለከም መዳሃኒቱ በቂ አይደለም
ለ. በሽታዉ መዳሃኒቱን መቋቋም ስለ ቻለ/እምብ ስለ አለ
ሐ. መዳሃኒቱ የተዘገጀበት ሁኔታ በቂ ይደለም
መ. ሌለ ከለ ይለዩት----------

9. በተራ ቁጥር 7 ጥያቄ መልሶት አዎ ከሆነ መዳሃኒቱ በቂ ያልሆነ መዳሃኒት ከነ ምክነሃቱ ዘርዝሩት?

ቀን	የተሰጠበት በሽታ አይነት	በቂ የልሆነ መዳሃኒት	ምክኒያት

10. ለተማሚዉ የምሰጥ የመዳሃኒት መጠን አናሳ የሆነ አላ? አዎ---------- አይደለም----------

11. በተራ ቁጥር 10 ጥያቄ መልሶት አዎ ከሆነ ምክኒያቱ ምንድነዉ?

ሀ. ለተለመለት አላማ ለማገኝ የመዳሃኒቱን መጠን አናሳ አድርጌኗል

ለ. በቀን የምወሰደዉ የመዳሃኒት መጠን ትንሽ ስለ ሆነ ነዉ

ሐ. ከሌላ መዳሃኒት ጋር ግጭት መጠኑን ስለ መቀንስ ነዉ

መ. መዳሃኒቶቹ የምወሰደብት ቀን አጭር ስለ ሆነ ነዉ

ሰ. ሌላ ከላ ይለዩት----------

12. በተራ ቁጥር 10 ጥያቄ መልሶት አዎ ከሆነ መጠኑ አናሳ የሆኑት መዳሃኒት ከነ ምክኒያቱ ይዘርዝሩት

ቀን	የተሰጠበት የበሽታ አይነት	መጠኑ ያነሳ መዳሃኒት	ምክኒያት

13. መጠኑ ከፍ ያለ መዳሃኒት አለ? አዎ---------- አይደለም----------

14. በተራ ቁጥር 10 ጥያቄ መልሶት አዎ ከሆነ ምክኒያቱ ምንድነዉ?

ሀ. መጠኑ ትልቅ /ከፍ ያለ ነዉ

ለ. በቀን የምሰጥ ወሰን / ሰዓት አጭር ስለ ሆነ ነዉ

ሐ. መዳሃኒቱ የተሰጠበት ቀን ረጅም ስለ ሆነ

መ. የመዳሃኒቶች ግጭት መጠኑ ከፍ ስለምያረጉ

ሰ. መዳሃኒቱ ቶሎ ቶሎ ስለምሰጥ

ረ. ኩላሊት ለለበት ሰዉ የመዳሃኒት መጠን ስለ ልተስተካከለ ነዉ

15. በተራ ቁጥር 10 ጥያቄ መልሶት አዎ ከሆነ መጠኑ ከፍ የሉት መዳሃኒት ከነ ምክኒያቱ ይዘርዝሩት

ቀን	የተሰጠበት የበሽታ አይነት	መጠኑ ከፍ ያለ መዳሃኒት	ምክኒያት

16. ችግር ያደረሰ/ያመጣ መዳሃኒት አለ? አዎ---------- አይደለም----------

17. በተራ ቁጥር 16 ጥያቄ መልሶት አዎ ከሆነ ምክኒያቱ ምንድነዉ

ሀ. መዳሃኒቱ ከመጠን ገራ ያለተያየዘ ችግር ስለ አመጣ ነዉ

ለ. የመደሃኒት ችግር የምያባብሱ ነገሮች ስለ አሉ የመዳሃኒት ደህነት መጠበቅ አስፈላግ ስለ ሆነ

ሐ. ከመዳሃኒቶች ግጭት የተነሳ ከመጠን ገራ የልተያዘ ችግር ስለ አመጣ

መ. መዳሃኒቱ አለርጂ ስለ አመጣ

ሰ. ለበሽታዉ መዳሃኒቱ ስለ መይሰጥ

ረ. ሌለ ከላ ይለዩት

18. . በተራ ቁጥር 16 ጥያቄ መልሶት አዎ ከሆነ ችግር ያመጣ መዳሃኒት ከነ ምክኒያቱ ይዘርዝሩት

ቀን	የተሰጠበት የበሽታ አይነት	የጎኒዮች ጉዳት ያመጣ መዳሃኒት	ምክኒያት

19.መዳሃነት አወሳሰድ ለይ ችግር አለ? አዎ----------አይደለም----------

20. በተራ ቁጥር 17 ጥያቄ መልሶት አዎ ከሆነ ምክኒያቱ ምንድነዉ?

ሀ.ታማሚዉ የመዳሃኒት አወሳሰድ ክትትል አላረገም

ለ.ታማሚዉ መዳሃኒቱን አለመዉሰድ ስለመረጠ

ሐ.ታማሚዉ መዳሃኒቱን መዉሰዱን ስለ ረሳ

መ.ታማሚዉ መዳሃኒቱን መዋጥ ስለ አልቻለ

ሰ. መዳሃኒቱ ስለ መይገኝ

ረ. መዳሃኒቱን መግዛት ስለ ምይችል

21 . በተራ ቁጥር 17 ጥያቄ መልሶት አዎ ከሆነ የጎኒዮች ጉዳት ያመጣ ና ታማሚ በአግባቡ ያልወሰደ መዳሃኒት ከነ ምክኒያቱ ይዘርዝሩት

ቀን	የተሰጠበት የበሽታ አይነት	በአግባቡ ያልተወሰደ መዳሃኒት	ምክኒያት

<u>ክፍል 5: የመዳሃኒት ሲህተቶች</u>

የመዳሃኒቶች ሲህተት መኖሩ ና አለመኖሩን የምንለይበት ሎጅካል ጥያቄዎች. የመዳሃኒቱ ሲህተት ከላ በፍለፊት ለይ ትክ ያድርጉ ’’√’’

1.የመዳሃኒት ሲህተት አለ? አዎ---------- አይደለም----------

2. በተራ ቁጥር ነ ጥያቄ መልሶት አዎ ከሆነ የተፈጠረ ሲህተት ዬቱ ነዉሽ

ሀ. የትዛዝ ሲህተት

ለ. ከፋርማሲ ስሰራጭ የተፈጠረ ሲህተት

ሐ. የድስፔንሲንግ ሲህተት

መ. ሌለ ካለ ይለዩት----------

3.ምርጫዎት ሀ ከሆነ ምክኒያቱ ምንድነዉ

ሀ. የተሳሰተ መዳሃኒት ስለ መታዛዙ

ለ. የመጠን ሲተት ሲለ ታዘዛ

ሐ. መዳሃኒት የምሰጥበት መንገድ ሲህተት ሰለ አለው ነዉ

መ. የመዳሃኒት አወሳሰድ ብዜት ሲህተት ስለ አለ ነዉ

ሰ. ሌለ ካለ ይለዩት----------

4.ምርጫዎት ለ ከሆነ ምክኒያቱ ምንድነዉ

ሀ.የተሳሰተ መዳሃኒት ከ ፋርማሲ ስለ ተሰጠ

ለ.ጠንከር ያለ የመዳሃኒት ሲህተት ከፋርማሲ ስለ ተሰጠ

ሐ. ሲህተት ያለዉ የመዳሃኒት ፎርሙለሽን ከፋርማሲ ስለ ተሰጠ

መ.ሌለ ከላ ይለዩት----------

5. ምርጫዎት ሐ ከሆነ ምክኒያቱ ምንድነዉ?

ሀ. ተደጋገመ ሲህተት

ለ. የምወሰድብት መንገድ ሲህተት ነዉ

ሐ. የመበጥበጥ ሲህተት ነዉ

መ. የምሰጥበት መጠን ሲህተት ነዉ

ሰ. ሳይሰጥ ሲቀር

ረ. ሌለ ከላ ይለዩት----------

ክፍል 6 ችግር የተፈጠረባቸዉ የህክሚና መዳሃኒቶች

ቀን	ሲህተት የተገኘበቸዉ የመዳሃኒት ቡድን	የህክሚና ችግሮች ዉስጥ የነበሩ መዳሃኒቶች	ምክኒያት

ክፍል 7: በመዳሃኒት በለሞያዎች የተሰጠ መፍቴ ና ጥቅሙ

ነ.የተሰጠ የመፍቴ አይነት

ሀ.ተጨማሪ መዳሃኒት---------- መ. መዳሃኒቱን መቀየር----------

ለ.የመዳሃኒት ምክር---------- ሰ. የመደሃኒቱ ፎርሙሌሽ የመቀየር----------

ሐ.የመዳሃኒት መጠን የመቀየር---------- ረ. መዳሃኒቱን የማስተዉ/ የማስቆም----------

2.የተሰጠዉ መፍቴ የተቀባይነት ደረጃ

ሀ.ሙሉ በሙሉ ተቀባይነት አግንቷል

ለ.ሙሉ በሙሉ ተቀባይነት አላገኘም 50

ሐ.ተቀበይነት አላገኘም

መ. የምታወቅ ነገር የለም

3.ለተሰጠዉ አስታይት መልስ የሰጡት

3.ነ. ሀክሞች

3.ነ.ነ . ሲይነሮች ሀክሞች

3.ነ.2. ሪዝደንቶች

3.ነ.3. እንተርኖች

3.2 ነርሶች

3.3 የተመሚዉ ቤተሰብ----------

Declaration

This is to certify that this research thesis is prepared by Desalegn Feyissa, which entitled with: "Drug therapy Problem and its contributing factors among pediatric patients with infectious disease admitted to Jimma university medical center, Jimma, South west Ethiopia." for the preparation of research thesis in partial fulfillment of the requirements for the degree of master of Science in Clinical Pharmacy.

I declare that this research thesis is my own original work and that it has not been presented to any other University for a similar or any other degree award.

Signature ----------

Date_____

Advisor**:** Mr. Dula Dessalegn (B.pharm, Msc in clinical pharmacy)

Signature ----------

Date_____

Internal examiner: Mrs.Kabaye Kumula (B.pharm, Msc in clinical pharmacy)

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Date_____