DRUG-RELATED PROBLEMS AMONG MEDICAL WARD PATIENTS IN JIMMA UNIVERSITY SPECIALIZED HOSPITAL, SOUTHWEST ETHIOPIA.

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Abstract

Background: The increasing number of available drugs and drug users, as well as more complex drug regimens lead to more side effects and drug interactions and complicates follow-up. A drug-related problem can be defined as an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes. The majority of hospitalized patients had drug related problems. The number of drugs used and the number of clinical/pharmacological risk factors significantly and independently influenced the risk for drug related problems.

Objectives: To assess drug-related problems and associated farctors in hospitalized patients. **Methods**: A hospital based cross-sectional study design was employed. The study was conducted in Jimma University Specialized Hospital, Jimma, which is 345 Km from South west of Addis Ababa. All patients who were admitted to medical ward from February 5 – March 21, 2011 were included in the study. Data on socio-demographic variables, past medical history, past medication history, current diagnosis, current medications, vital signs and relevant laboratory data were collected by using bed side patient interview guided semi-structured questionnaire and data abstraction formats for card review. The data were analysed by using SPSS version 16 for windows. Descriptive statistics, cross-tabs, chi-square and logistic regression were done.

Result: Out of 257 study participants 189(73.5%) had drug-related problems. From patients with drug-related problems a total of 316 drug-related problems were identified. From the six classes of drug-related problems studied, 103(32.6%) of the drug-related problems were need additional drug therapy followed by high dosage 49(15.5%). Unnecessary drug therapy 49(14.9%), low dosage 44(13.9%) and ineffective drug therapy 42(13.3%) were the other classes of problems identified. Among the studied drug-related problems, non-compliance 31(9.8%) was the least prevalent drug-related problem. Independent factors which predicted the occurrence of drug-related problems in study population were sex, age, polypharmacy and clinically significant potential drug-drug interaction. From the study population 42(16.3%) had clinically significant potential drug-drug interaction.

Conclusions: The prevalence of drug-related problems was substantially high(73.5%). Furthermore, all classes of drug-related problems were common. Clinically significant drug-drug interactions were more common among admitted patients with in the study period.

Recommendation: For a better delivery of health services with regard to patient care and management clinical pharmacist should be assinged to internal medicine wards. Drug therapy regimens which contain anti-tuberculosis drugs should be evaluated for clinically significant drug-drug interactions.

Key words: Drug-related problems, unnecessary drug therapy, need additional drug therapy, ineffective drug, and inappropriate dosage.

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List of Tables

List of figures

Table of Contents

Acronyms

ACE- inhibitors	Angiotensin converting enzyme inhibitors
ADR	Adverse drug reaction
DRP	Drug-related problem
DRCs	Drug-related complications
ED	Emergency department
ESS	Educational strategy study
GI	Gastrointestinal
NSAIDs	Non-steroidal anti- inflammatory drugs
PCNE	Pharmaceutical network Europe
TRPs	Treatment related problems

1. Introduction

1.1 Background

Drugs are important in prevention and treatment of disease and health complaints. The increasing number of available drugs and drug users as well as more complex drug regimens lead to more side effects and drug interactions and complicates follow-up[1]. A drug-related problem (DRP) can be defined as an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes[2]. The term problem in the phrase drug-related problem is used to denote a drug related event amenable to detection, treatment, or more appropriately prevention[3]. Drug-related problems are classified into 8 general categories which include untreated indication, treatment without indication, improper drug selection, too little drug, too much drug, non-compliance, adverse drug reaction (ADR), and drug interaction[3]. Pharmaceutical network Europe (PCNE) classified problems in to six primary domains; adverse reaction, drug choice problem, dosing problem, drug use problem, interactions and other[2]. In order for an event to qualify as a DRP at least two conditions must exist:

1) A patient must be experiencing or must be likely to experience, disease or symptomatology; and
2) These conditions must have an identifiable or suspected relationship with drug therapy[3].

Pharmaceutical care is the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life. When the outcome is not optimal, a DRP will occurr[3]. Despite the fact that many DRPs can be resolved without major impact on patient health, some can be associated with significant morbidity and mortality. The majority of hospitalised patients in Norway had DRPs. The number of drugs used and the number of clinical/pharmacological risk factors significantly and independently influenced the risk for DRPs. Procedures for identification of and intervention on actual and potential DRPs, along with awareness of drugs carrying a high risk for DRPs, are important elements of drug therapy and may contribute to diminishing drug-related morbidity and mortality[4].

Review of literatures done in United States of America pertaining to the incidence, classification, severity, preventability and economic impact of drug-related visits to the emergency department suggests that DRPs are a significant cause of emergency department

(ED) visits and subsequent resource use. Regardless of the study design, hospitalization of patients presenting to the ED with a DRP was estimated at 8.6% to 24.2% and was associated with increased patient morbidity and costs to health care system. The populations that appear to be most at risk include women and the elderly. Since approximately 70% of these visits are deemed preventable, primary care providers including family physicians and community pharmacists should collaborate more closely to provide and reinforce care plans and monitor patients to prevent drug-related ED visits and subsequent morbidity and mortality[5].

Medication-related problems occur commonly in the Australian community setting, with nine out of ten people at risk of medication misadventure experiencing some type of problem.Cardiovascular, nervous system, alimentary and respiratory medicines were most commonly associated with medication-related problems in the community. Some of the medication-related problems that were observed, such as difficulties with technique for respiratory medications and the occurrence of predictable ADRs with non-steriodal anti inflammatory drugs (NSAIDs) could be expected or predicted[6].

The solution to reducing the problem of DRPs and reducing the impact of drug-related visits to the ED requires a multidisciplinary, collaborative approach in ambulatory practice, hospital practice, and the health care system. First, identification of high-risk patients and those receiving high-risk medications should be the focus of strategies to reduce the likelihood of adverse drug events by either reduction of the risk or increased monitoring to ensure early identification of a DRP. Second, community and hospital pharmacists must take a leadership role in improvements in patient education. Third, a stronger relationship between patients, their primary physician, and their community pharmacist is necessary to create a collaborative environment to attempt to reduce drug misadventure. This stronger collaborative relationship increase awareness of DRPs and their potential impact as well as facilitate more diligent patient monitoring and improved patient education. Finally, the presence of a clinical pharmacist in an ED or an emergency medicine practice group allows for the incorporation of a drug therapy expert as an integral member of the health care team to identify and resolve DRPs in the ED[5].

1.2 Statement of the Problem

For most diseases, drug therapy will enhance health related quality of life. However, inappropriate use of drugs may be harmful and could evoke new symptoms. Drug therapy is growing more complex, thus making appropriate drug prescribing increasingly challenging. Drug-related problems are a major safety issue for hospitalized patients[7]. Some of the DRPs existed at the time of admission to hospital, while others arose during hospital management[4]. Studies evaluating drug-related hospitalization have estimated that approximately 5% to 10% of all hospital admissions are drug related[5]. At least 22% of the discharged patients in Spain suffered real or potential DRPs[8]. Pharmacists providing pharmaceutical care to seniors in the primary care and general medicine setting identify approximately three DRPs and make over three recommendations per patient[9].

On average 2.6 DRPs occur per patient in internal medicine ward and the presence of DRPs increased approximately linearly with the number of drugs used, for the range of one to > 11 drugs in Norway[10,11]. Acording to a study done in five Norwegian hospitals the number of drugs at admission is a risk factor for having an unnecessary drug, a nonoptimal drug or a non-optimal dose[4].

Where drug histories are recorded there was sometimes a failure to note potential drug-related problems. Analysis of the medication-related problems in Australian community setting has highlighted important differences in the nature of problems that occur across drug classes. Gastrointestinal agents were characterised by the over-use of medicines,while under-use of medication was observed with respiratory drugs. Central nervous system agents revealed under-use with analgesics, but over-use with psycholeptics. Problems with cardiovascular medicines were more complex, involving poor therapeutic monitoring, adverse reactions, wrong or inappropriate selection and dosing[6].

A study from four Norwegian hospitals concluded that nearly half of the hospitalised patients were prescribed antibiotics and antibiotic associated DRPs occurred frequently. The drug risk ratio for the different antibiotic groups varied with a factor of six from the lowest to the highest. A high drug risk ratio would alert of antibiotics which require heightened awareness when going to be used in clinical practice. Most patients admitted to hospitals are severely ill, and when suspecting an infection, the physician has to make quick decisions about the need

for antibiotic treatment, choice and dose of antibiotic, route of administration and duration of treatment. These decisions may influence the pharmacokinetics and pharmacodynamics of concomitantly used drugs and could give rise to DRPs[12].

A study from Swiss cardiovascular outpatients revealed most patients presented at least one DRP (69%). In the majority of the cases, patients did not receive a needed drug based on the clinical data or diagnoses (e.g., a statin or a daily low dose of acetylsalicylic acid). Conversely, some patients received an unneeded drug (e.g., digoxin or allopurinol without any indication). The DRPs with a potential effectiveness consequence were related to suboptimal adherence and to a sub-dosage resulting in uncontrolled clinical values. These problems exclusively concerned three therapeutic classes: antihypertensive, lipid-lowering and antidiabetic drugs. The additional effectiveness problems were non-quantitative and concerned the non-use of the most effective drug for the indication according to the evidence based medicine. Some other DRPs are potential safety non-quantitative problems related to pharmacodynamic drug–drug interactions, contraindications or inadequate use of a nonsteroidal antiinflammatory drug (NSAID) instead of acetaminophen (paracetamol). The remaining quantitative problems led to recommendations of dosage reductions[13].

Eventhough studies on DRPs from African and Ethiopia could not be found, it will not be difficult to judge the possible negative impacts DRPs in patient care and management. Two important points can possiblely indicate the presence DRPs in hospitals of Ethiopia; the use similar drug groups and individual drugs which are causing DRPs in developed countries and the absence clinical pharmacy service which can minimize the occurrence of DRPs.

2. Literature Review

Drug-related problems are expected to be more prevalent among hospitalized patients. Even though different terms were used to note the different classes of DRPs by different studies, the operational definitions used by the respective studies make them similar.

A prospective study from six internal medicine and two rheumatology departments in five hospitals in Norway found that of the total patients involved in the study 81% had DRPs and an average of 2.1 clinically relevant DRPs per patient[4]. Another prospective bed side clinical assessment from internal medicine ward in one of the largest general hospital in Jordan found that of the total patients 98.3% had treatment related problems (TRPs) and on average 9.35 TRPs occurred per patient[14]. An observational, prospective, multicentre study conducted on patients from 10 hospitals in Valencia, Eastern Spain found that of the total of 7711 patients included in the study 23.7% had DRPs, with a total of 2120 DRPs (1788 at discharge and 332 in the follow-up)[8].

Drug related problems are also common in community setting. A review 1000 clinical case notes, developed during the delivery of medication management reviews in Australia identified an overall of 2222 medication-related problems. Ninety per cent of patients had at least one medication-related problem[6]. The observational, longitudinal study done at the School Pharmacy of Newton Paiva University Center, Belo Horizonte, Brazil found out of the uncontrolled health problems of patients 73.6% were drug-related problems[15]. Nation-wide sample of medication reviews conducted between 1998 and 2005 in Australia identified 1,038 drug-related problems from 234 medication reviews (mean 4.6 (±2.2) problems per review). The number of problems was higher (4.9 ± 2.0 vs. 3.9 ± 2.2) in reviews for home-dwelling patients compared with care-facility residents. The number of clinically-significant problems was higher (2.1 ± 1.1 vs. 1.5 ± 0.7) for home-dwelling patients[16].

The DRPs most frequently recorded by a study in Norway were dose-related problems (35.1% of the patients), non-optimal drugs (21.4%) and need for additional drugs (19.7%). The other problems were unnecessary drugs (16.7%), no further need (9.4%), interaction (8.8%), adverse drug reactions (7.8%) and compliance problems (2.9%)[4]. The finding of a study done in Jordan revealed from the total TRPs identified 30.66% were efficacy related problems. Among the efficacy related problems, efficacy dosage regimen issue (16.49%) and patient requires additional/combinational therapy (7.15%) were more common. The other efficacy related problems identified were more effective drug is available/recommended (6.60%) and

efficacy interaction issue (0.43%). From the total TRPs 24.94% were safty related problems. Among the safety related problems safety dosage regimen issues (8.38%), safety interaction issue (7.37%) and allergic reaction or undesirable effect (3.99%) were common. The other safety related problems identified were the patient is high risk for developing adverse drug reaction and needs monitoring/ prophylaxis (3.83%) and a current drug is contraindicate and/or a safer medication is recommended (1.57%). Among the TRPs identified 16.44% were indication related problems which includes unnecessary drug therapy (5.93%) and untreated condition that requires drug therapy (10.51%). Adherance related problems account 6.42% of the total TRPs[14]. The more frequent DRPs from a study in Brazil were effectiveness related problems (53.2%), necessity related problems (25.2%) and safety related problems (21.6%)[15].

The most frequent classes of DRPs identified among patients discharged from medical departments by a study done in Spain were need additional treatment (34.5%), inappropriate drug (18.4%), under dosage (15.0%) and unnecessary treatment (14.3%). The other classes identified were over dosage (12.6%) and non-compliance (0.6%)[8]. An observational study on 100 geriatric patients hospitalized to Internal Medicine Department during 2006 - 2007 in two hospitals in Yogyakarta Indonesia found unnecessary drug therapy in 63 cases (63 %) with total 117 incidences[17].

The common types of DRPs identified by a review of clinical case notes in Australia were use of wrong or inappropriate medicine (26.8%), need for additional medication (24.9%) and use of too little medicine (20.5%). The other types of DRPs identified were compliance problems (13.2%), use of too much medicine (12.2%), use of unnecessary medicine (10.3%) and duplication of medications (3.1%)[6].

The common types of DRPs identified by nation-wide sample of medication reviews conducted in Australia were drug selection problems (24.9%), adverse drug reactions (19.7%), untreated indications (15.7%) , compliance problems (11.0%) and over or underdose prescribed (8.9%). Compliance problems were identified in home medicines reviews significantly more frequently than with residential medication management reviews[16].

A cross sectional survey conducted during 22nd February to 30th May 2003 , involving five major hospitals in Nepal covering Kathmandu, Bharatpur and Palpa found 63 admissions

which were due to drug related complications. Adverse Drug Reactions (ADRs) caused 51 (80.96%) of the complications followed by overdose (17.46%) and wrong dose (1.58%)[18].

A study done in Jordan identified different reasons for different types of TRPs. Drug use without an indication, the patient treatment should be stepped down and duplication of therapy were reasons mentioned for unnecessary drug therapy. Untreated condition that need drug therapy and patient requires additional/combinational therapy were the reasons mentioned for additional drug therapy need. More effective drug is available/recommended, low dose, correct dose but in-appropriate frequency, short duration and drug interactions were reasons mentioned for efficacy related problems. High dose, correct dose but inappropriate frequency and excessive duration were reasons mentioned for safety related problems[14].

A study done in Spain found that need additional drug therapy were mostly due to an untreated indication or discontinuation of a necessary treatment in the hospital. Treatment duplicity was the frequent reason for unnecessary drug therapy[8].

A nation-wide sample of medication reviews done in Australia identified different reasons for different classes of DRPs. Condition not adequately treated and preventive therapy required were reasons mentioned for untreated indications. Duplication, drug interaction and wrong dosage form were reasons mentioned for drug selection problems. Dose too high and dose too low were reasons mentioned for inappropriate dose. Taking too little, taking too much and difficulty using dosage form were reasons mentioned for compliance related problems[16].

A study done in six different hospitals in Norway had identified drugs which mostly involved with DRPs. Angiotensine converting enzyme inhibitors(ACE-inhibitors), antibacterials and corticosteroids were drug classes mostly involved with non-optimal dose. Non-steriodal antiinflammatory drugs (NSAIDs) and antibacterials were drugs mostly involved with non-optimal drug. Calcium and analgesics were involved with need for additional drug. Analgesics and dalteparin were involved with unnecessary drug therapy. Dalteparin and antibacterials were involved with no further need. NSAIDs, antidepressives and acetylsalicylic acid were involved with adverse drug reactions. Drugs for obstructive airways diseases were involved with compliance problems[4].

A study done in Jordan had identified drugs which mostly involved with DRPs. Proton pump inhibitors, beta2-agonists, H2-blockers, antibiotics, ACE-inhibitors and NSAIDs were involved with unnecessary drug therapy. ACE-inhibitors, aspirin, thiazide diuretics, beta-blockers and beta2-agonists were drugs involved with additional drug therapy need. Calcium channel blockers (dihydropyridines), H2-blockers, beta-blockers, loop diuretics, antiplatelets (ticlopidine), sulfonylureas and biguanide were involved with ineffective drug therapy. Antibiotics, insulin, NSAIDs, anticoagulants, ACE-inhibitors, statins, steroids, inhaled steroids and beta-blockers were involved with low dosage. Antimicrobials, beta-blockers, calcium channel blockers, antiplatelets, steroids, anticoagulants, beta2-agonists and proton pump inhibitors were involved with high dosage[14].

A review clinical case notes, developed during the delivery of medication management reviews in Australia identified drugs mostly involved with DRPs. Diuretics, beta-blockers, calcium channel blockers, ACE-inhibitors, analgesics, psycholeptics and NSAIDs were implicated with wrong drug. Diuretics, digoxin, ACE inhibitors, paracetamol, psycholeptics, inhaled corticosteroids, diabetic agents, drugs for peptic ulcer, NSAIDs, and allopurinol were implicated with wrong dose. Ranitidine was implicated with unnecessary drug therapy. Laxatives and aspirin were implicated with need additional drug therapy[6]. A prospective multicentre study of patients admitted to six internal medicine departments—represented by cardiac, respiratory and geriatric wards at four hospitals in Norway showed antibiotic users to have more DRPs (3.0 vs. 2.2) than non-users[12].

The number of clinical/pharmacological risk factors (reduced renal function (creatinine clearance below 50 ml/min or serum creatinine above normal range), reduced liver function [aspartate amino transferase (AST) or alanine aminotransferase (ALT) three times above normal values], confirmed diabetes mellitus, cardiac failure, history of allergy or adverse reactions to drugs, assumed noncompliance, use of drugs with a narrow therapeutic index, and other factors that could affect taking the drugs prescribed, including alcohol abuse and problems with swallowing) and number of drugs at admission were shown to be independent risk factors for the occurrence of DRPs while age and gender were not. For each additional clinical/pharmacological risk factor, the risk of occurrence of DRPs was increased by 1.14, and each additional drug increased the risk for a DRP by 1.04. The number of drugs at admission was a risk factor for having an unnecessary drug, a nonoptimal drug or a non-optimal dose. The number of clinical/pharmacological risk factors was a risk factor for having

an interaction, non-optimal dose, need for laboratory tests or an additional drug. Age was only shown to be an independent risk factor for having an unnecessary drug[4].

Both number of chronic medical conditions and number of medications were strongly associated with number of TRPs. Gender was not associated with TRPs[14]. The number of DRPs per patient increased approximately linearly with the increase in number of drugs used; one unit increase in number of drugs yielded an 8.6% increase in the number of DRPs[11].

A retrospective cross-sectional study performed in an acute-care hospital in Singapore revealed that of the total 347 patient prescribed polypharmacy (43% female and 58.2% geriatrics), no statistical correlations were observed between age and gender with developing DRPs. An increased number of medications was associated with higher risk for patients with DRPs on admission ($p = 0.001$), but not for inpatients with DRPs ($p = 0.119$)[19]. Number of unnecessary drug therapy incidence in patients with five drugs or less/day was lower than patients with more than five drugs/day during the hospital stay: 0.78 vs 1.91 respectively ($P = 0.000$)[17].

Potential drug-drug interactions

A secondary data analysis from the Educational Strategy Study (ESS) involving both doctors and patients over 50 years of age in Mexican Institute of Social Security (IMSS) family medicine clinics, Mexico found that; 80.0% of patients had prescriptions implying one or more potential drug-drug interactions and 3.8% of patients were prescribed drug combinations with interactions that should be avoided[20].

A study done in University Medical Centre Utrecht, which is a university teaching hospital in Netherland, found 10% of all prescriptions generated a drug-drug interactions alert; overall 27.8% of patients encountered at least one potential drug-drug interaction[21]. An other study done in Cantonal Hospital of Baden, Switzerland found 1.11 clinically relevant potential drug-drug interaction during hospitalization per patient, which was higher compared to hospital admission (0.59) or to hospital discharge (0.60)[22].

A cross-sectional survey conducted from November 2002 to March 2003 in a surgical and a medical department of the H:S Bispebjerg Hospital in Copenhagen concluded that; although

potential drug-drug interactions are highly prevalent, serious and clinically significant interactions are rare among recently hospitalised patients[23].

Although most of the studies reviewed were from developed countries (i.e. Europe, Australia) because of absence of data or literatures done in Africa including Ethiopia, it is easy to know the presence of DRPs in developing countries like Ethiopia. Since, most of the drugs associated with DRPs from the reviewed literatures are commonly used in Ethiopia. Generally, DRPs were very common among hospital admitted patients and the number of drugs used, drug-interaction and number of diagnosed diseases were found to be risk factors for different classes of drug-related problems in most of the studies.

3. Significance of the Study

Patients who have drug-related problems are likely to experience increased morbidity and mortality. Preventing DRPs is important because it saves patients lives, protects patients health, and reduces the costly emergency services for drug and disease related complications. The demand for identification of DRPs at all levels of patient care service is undeniable. Investigating the cause of DRPs helps to understand the situation and facilitate the patient care service. This study aims at providing information on drug-related problems that plays a vital role in managing patients pharmacotherapy complications. The study aims to provide information on the common classes of problems, the reasons which made drug therapy a problem and drugs involved with each type of problems. The study also aims to give information on the predictors of the occurrence of DRPs.This study was the first study done on DRPs in Jimma University Specialized Hospital and as to the knowledge of the principal investigator also in Ethiopia. Therefore, it will serve as a base line research for other studies which will be done on pharmaceutical care and drug-related problems.

4.Conceptual framework

The conceptual framework was designed from the reviewed literatures and the principal investigators perception on the actual conditions in the study area. Number of drugs, number of diagnosed diseases, chronic illness, organ function and social drug use were found to affect the occurrence of DRPs from reviewed literatures. Socio-demographic variables, length of hospital stay, type of diagnosed disease, self medication experiences and advice or counselling on drugs were added by the principal investigators personal judgment.

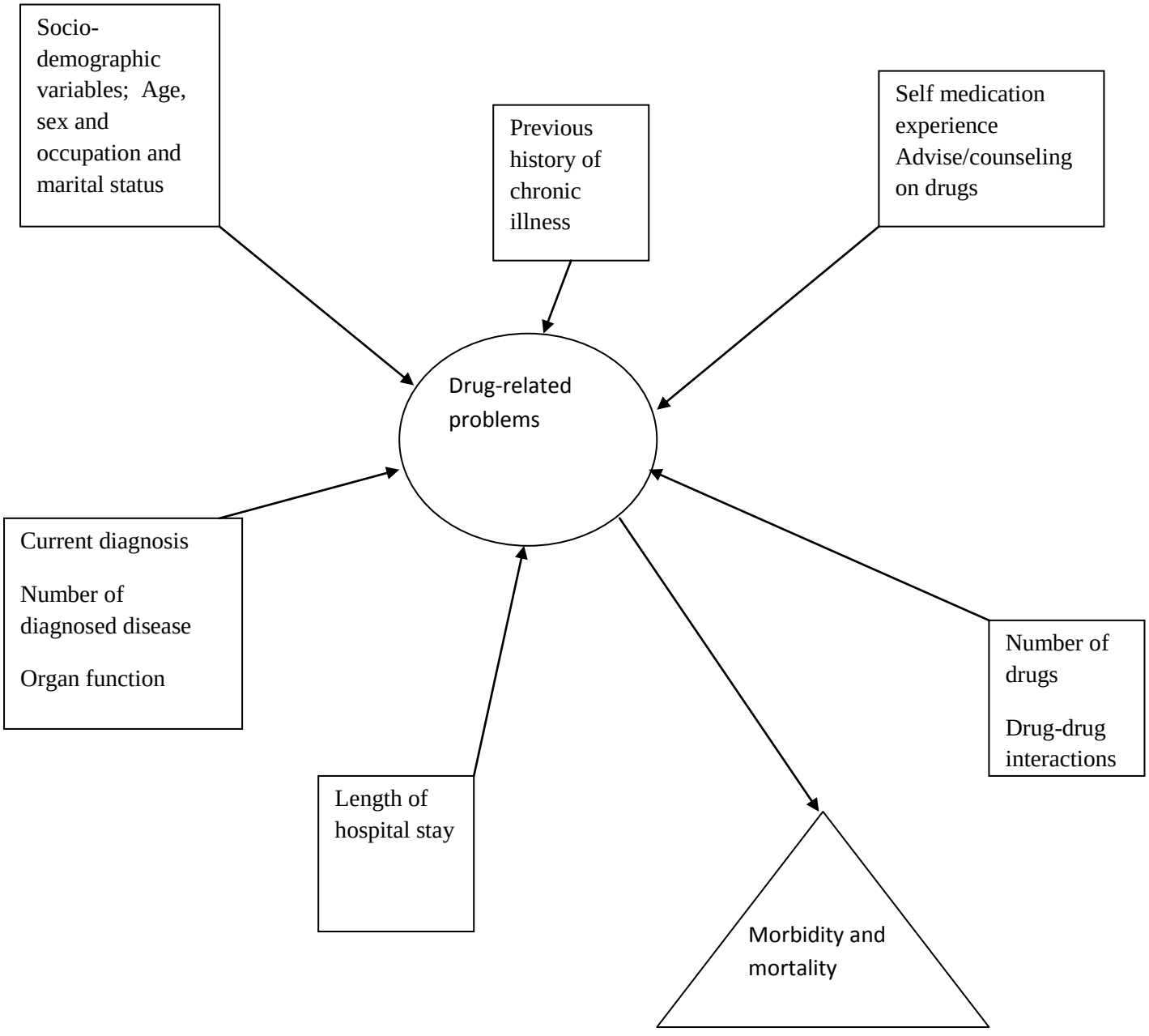

Figure1: Conceptual framework for drug-related problems among admitted patients.

5. Objectives of the study

5.1 General Objective

To assess drug-related problems and associated factors in hospitalized patients among medical ward patients from February, 5, 2011- March, 21, 2011.

5.2 Specific Objectives

1. To determine number of drug-related problems among medical ward patients from February, 5, 2011- March, 21, 2011.
2. To assess drugs involved with drug-related problems among medical ward patients from February, 5, 2011- March, 21, 2011.
3. To assess reasons for specific drug-related problem among medical ward patients from February, 5, 2011- March, 21, 2011.
4. To identify predictors for drug-related problems among medical ward patients from February, 5, 2011- March, 21, 2011.
5. To assess clinically significant drug-drug interactions among medical ward patients from February, 5, 2011- March, 21, 2011.

6. Subjects and methods

6.1 Study area and Period

The study was conducted in Jimma University Specialized Hospital, Jimma, which is 345 Km from South West of Addis Ababa, from February 5, 2011 – March 21, 2011.The hospital is a tertiary hospital with internal medicine, surgery, pediatrics, maternity and gynacology, ophtalmology, psychaitry and dermatology service providing departments with other supportive classes. It provides specialized health services for approximately 9000 inpatients and 80000 outpatients each year with bed capacity of 450 and a total of more than 550 staffs[24]. Internal medicine department provides inpatient services in five different ward rooms with a total of 85 beds and with 10 internists.

6.2 Study design

A facility based cross-sectional study design was employed.

6.3 Population

6.3.1 Source population

Source population were all medical ward patients in Jimma University Specialized Hospital.

6.3.2 Study population

All patients who were found admitted in internal medicine ward of Jimma University Specialized Hospital during the study period.

6.4 Exclusion criteria

Exclusion criteria :

- Patients who will be discharge before the collected data were cross-checked.

6.5 Sample size and sampling technique

6.5.1 Sample size

All patients who were found receiving internal medicine ward services in the study period were covered in the study.

6.5.2 Sampling technique

No sampling technique was employed since all of the study population who fullfil the inclusion criteria were covered.

6.6 Data collection and measurement

6.6.1 Variables

6.6.1.1. Independent variables

- Socio-demographic variables(age, sex, marital status, educational level, occupation, family size)
- Previouse history of chronic illness(type of chronic illness, drug use for chronic illness)
- Medication history(self-medication experience, social drug use, counselling or advise on prescription and self-medication drugs)
- Current medication(Average number of drugs per day)
- Type and number of diagnosed diseases
- Organ function test
- Length of hospital stay
- Clinically significant drug-drug interactions

6.6.1.2 Dependant variables

- Drug related problems, which include the following six classes, is the dependant variable.

- unnecessary drug therapy
- Need additional drug therapy
- Ineffective drug
- Dosage too low
- Dosage too high
- Non-compliance

6.6.2 Data collection instrument

Pre-tested interview guided semi-structured questionnaire and data abstraction formats were used for data collection. The questionnaire had questions on socio-demographic variables, past medical history, medication history, social drug use and questions on compliance. The data abstraction format had formats for length of hospital stay, current diagnosis, laboratory values, vital signs and current medication history. The questionnaire was prepared in English and translated to Amharic and Afan Oromo. The translation was converted back to English by an other person to check consistency of translation. For identification of DRPs; Harrison's principles of internal medicine, 17th edition, Pharmacotherapy: a pathophysiologic approach, 7th edition, Applied therapeutics: the clinical use of drugs, Uptodate®2009, Guidelines for management of opportunistic infections and anti retroviral treatment in adolescents and

adults in Ethiopia, 2007 and Standard treatment guideline for general hospital, 2010 were used. Cockcroft-Gault equation was used to estimate glomerular filtration rate and the classification of creatinine clearance was done by considering glomerular filtration rate classification for chronic renal failure. The possible interactions between drugs was evaluated using the Micromedex® health care series soft ware and Stockley's drug interactions 2009. The drug-related problems classification by "pharmacetical care practice the clinician's guide" were adopted. The drug-related problems evaluation tool was designed by questionnaire like format. The drug-related problems evaluation tool was prepaired based on the catagories and reasons in "pharmacetical care practice the clinician's guide"[25].

Table 1. Drug Therapy Problems as Unmet Drug-Related Needs

Drug-related needs	Categories of drug therapy problems
Indication	1. Unnecessary drug therapy
	2. Needs additional drug therapy
Effectiveness	3. Ineffective drug therapy
	4. Dosage too low
Safety	5. Adverse drug reaction
	6. Dosage too high
Compliance	7. Non-compliance

6.6.3 Data collectors

Four third year Afan Oromo speaking pharmacy students from Jimma university pharmacy department were recruited for data collection.

6.6.4 Data collection process

Two days training was given by the principal investigator to data collectors on the objectives of the study and how to interview, how to fill the questionnaire and handle questions asked by clients during interviewing and how to abstract data from patient card. The principal investigator strictly followed the over all activities on daily base to ensure the completeness of questionnaire and to give support for data collectors. For assessment of compliance of the patient all currently prescribed drugs were searched, the pills were counted, the patients were asked which drugs they had been taking and the administration chart was reviewed and cross-checked with the order sheet. Need additional drug therapy, unnecessary drug therapy, ineffective drug therapy and inappropriate dosage were identified by principal investigator after important information were collected by the data collectors. For each problem

identification the diagnosis settled by prescribers, vital signs and abnormal laboratory data with respective drug therapy prescribed were cross-checked with recommendations given by the following resources; Harrison's principles of internal medicine, 17th edition, Pharmacotherapy: a pathophysiologic approach, 7th edition, Applied therapeutics: the clinical use of drugs, Uptodate®2009, Guidelines for management of opportunistic infections and anti retroviral treatment in adolescents and adults in Ethiopia, 2007 and Standard treatment guideline for general hospital, 2010. If the prescribed drugs were in agreement with one of the resources in terms of treatment choice, dosage and dosage form, it would be counted as problem free. However, any difference from the recommendation given by the resource materials results in DRPs. To increase consistency in the identification process, each patient questionnair was checked three times. The clients were interviewed while they were still in the ward.

6.7 Operational definition

Clinically significant drug-drug interactions: Interactions said to have major or moderate severity and good or excellent documentations by Micromedex® health care series soft ware and interactions said to have a life threatening outcome, or where concurrent use is contraindicated by the manufacturers or concurrent use may result in a significant hazard to the patient and so dosage adjustment or close monitoring is needed by Stockley's drug interaction, 2009.

Dosage: Includes the dose given, the frequency of administration and the duration of therapy.

Dosage too high: The drug dosage is too high to result in undesirable effects.

Dosage too low: The drug dosage is too low to produce the desired response.

Effectiveness related problems: Low dosage or ineffective drug therapy

Indication related problems: Unnecessary drug therapy or need additional drug therapy.

Inappropriate dosage: Dosage too high or dosage too low

Ineffective drug therapy: The drug or the dosage form is not recommended for the condition at producing most effective desired response.

Illitrate: Patients who do not read or write

Need additional drug therapy: A drug therapy is required to treat or prevent a medical condition or illness from developing.

Non compliance: The patient is not able or willing to take the drug therapy as intended and taking unprescribed drugs.

Polypharmacy: Concomittant use of five or more drugs on average per day.

Unnecessary drug therapy: A drug therapy when the patient does not have a clinical indication at the time of data collection.

6.8 Data analysis

The data collected by patient interview questionnaire were translated to English by health professionals who are proficient in Amharic and Afan Oromo. The English version of the data from patient interview, data from abstraction formats and data from DRP evaluation questionnaire were cleaned, coded, entered to SPSS for windows, version 16 statistical software. The data was cleaned again after the entry by doing frequencies and observing inconsistencies. Descriptive statistical analysis and cross tabs were done. Chi-square and binary regressions with 95% confidence interval were done to find out statistical significance. P-value less than 0.05 was used to declare association. For specific types of DRPs the predictors statistically associated with the occurence of a respective type of DRP significantly by crude odds ratio and those which had statistically significant association with the occurence of DRP in general by crude odds ratio were only presented by table.

6. 9 Pre-test

Questionnaires, data abstraction formats and drug-related problems evaluation tool were pre-tested on 15 (5% of the total expected study population) patients admitted in Jimma University Specialized Hospital internal medicin ward for the accuracy and consistency prior to actual collection of data on patients included in the study. The pre-test was done on 29/02/2011 which was a week before the actual data collection. Seven patients who were involved in pre-test were found at the actual data collection period and excluded from the study. Income and family history of chronic illness were not found to be answered appropriately by study participants. Therefore, these variables were removed from the study. The formats for laboratory result, vital signs and prescribed drugs abstraction were corrected after the pre-test .

6.10 Data quality control

The principal investigator were giving feedback and correction on daily basis for the data collectors before they were deployed to the wards. Completeness, accuracy, and clarity of the collected data were checked carefully. Any error, ambiguity and incompleteness which was not observed at supervision was addressed on the following day before starting next day activities. Three questionnaires which couldn't be corrected in the following day were removed from the analysis.

6.11 Ethical clearance

Ethical clearance was obtained from Ethical Review Board of Jimma University. Letter for cooperation was also obtained from Jimma University Pharmacy department. The medical director of the hospital and head of the internal medicine ward allowed the data collection after they had seen the coopration letter and the data collection instruments. All patients were given written informed consent in Amharic or Afan Oromo to determine if they were willing to participate in the study. Fortunately, all patients were voluntary to be evaluated. Patients response and chart reviewed information was kept confidentialy by ommitting patient's name and locking the filled questionnaires.

6.12 Communication of Results

The result of the study will be disseminated to relevant bodies such as department of pharmacy, Jimma University Specialized Hospital, Federal Ministry of Health, Regional health bureau, zonal and district health offices in Jimma. Further more, effort will be made to publish the thesis.

7. Result

Socio-demographic characteristics

A total of 257 patients admitted to internal medicine ward of Jimma University Specialized Hospital from February 5, 2011 to March 21, 2011 were involved in the study. The mean age of study participants was 40.9 years with standard deviation of 16.82.

Among the study participants 136(52.9%) patients were male. One hundred sixty one (62.6%) of study participants were illitrate and 196(76.3%) were married. Ninty two (35.8%) of patients involved in the study were farmers and 139(54.1%) were having less or equal to five family members(Table 2).

Table 2: Socio-demographic characterstics of medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

Socio demographic variable		**Mean**	**Standard deviation**
Sex	Male	136	52.9
	Female	121	47.1
Educational status	Illitrate	161	62.6
	only read and write	5	1.9
	primary 1st cycle	24	9.3
	primary 2nd cycle	24	9.3
	secondary school	28	10.9
	post secondary school	15	5.8
Marital status	Married	196	76.3
	Single	45	17.5
	Divorced	1	.4
	Widowed	15	5.8
Occupation	Farmer	92	35.8
	daily labourer	14	5.4
	Trader	14	5.4
	government employee	22	8.6
	house wife	72	28.0
	Student	24	9.3
	Others	19	7.4
Family size	≤ 5	139	54.1
	> 5	118	45.9

- Others: tureta, no work, house rent and supported by children

Drug- related problems

Among patients involved in the current study 189 (73.5 %) had drug-related problems. Ninty seven (37.7%) had a single drug-related problem. On average 1.2 drug-related problems were identified per patient(Table 3).

Table 3: Patients who had drug-related problems and number of problems per patient among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Frequency	Percent
Patients had DRPs	Yes	189	73.5
	No	68	26.5
Number of DRPs per patient	0	68	26.5
	1	97	37.7
	2	59	23.0
	3	31	12.1
	4	2	0.8

A total of 316 drug-related problems were identified. One hundred three(32.6%) of the DRPs were need additional drug therapy followed by high dosage 49(15.5%)(Table 4).

Table 4: Type of drug related problems identified medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

Type of problem	Frequency	Percentage from total problem(316)	Percentage from total patients(257)
Need additional drug therapy	103	32.6	40.1
High dosage	49	15.5	19.1
Unnecessary drug therapy	47	14.9	18.3
Low dosage	44	13.9	17.1
Ineffective drug therapy	42	13.3	16.3
Non-compliance	31	9.8	12.1

Reasons which made drug therapy a problem and drugs involved with DRPs

Among the reasons which lead to need additional drug therapy 50(43.1%) were the presence of a medical condition that requires initiation of drug therapy. Tweenty nine (61.7%) of the reasons which lead to unnecessary drug therapy were invalid indication for drug therapy at the

time of prescribing. Among the reasons identified for ineffective drug therapy 30(71.4%) were the drug were not the most effective for the medical condition. Tweenty (41.7%) of the reasons for low dosage were the dose given was low. Tweenty five (45.5%) of the reasons which lead to high dosage were too short dosing frequency. Fifteen (48.4%) of the reasons which lead to non-compliance were the drug product was not available for the patient (Table 5).

Table 5: Reasons which made drug therapy to be considered as problem for the individual class of problems for medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

Class of drug-related problems	**Reasons**	**Frequency(%)**
Need additional drug therapy	A medical condition that requires initiation of drug therapy	50(43.1)
	Preventive drug therapy required to reduce risk of developing a new condition or progression of the exsting condition	48(41.4)
	To attain synergistic or additive effects	18(15.5)
Unnecessary drug therapy	Invalid indication for the drug therapy	29(61.7)
	Multiple drug products used for a condition that need asingle drug therapy	18(38.3)
Ineffective drug therapy	The drug was not the most effective for the medical condition	30(71.4)
	The dosage product was inappropriate	7(16.7)
	The medical condition was refractory to a drug	3(7.1)
	There was an other drug which can target multiple conditions	2(4.8)
Low dosage	The dose given was low	20(41.7)
	There was drug interaction which decreases the concentration of a drug	19(39.6)
	The dosing frequency was too infrequent to produce the desired response	8(16.7)
	The duration of drug therapy was short to produce the desired response	1(2.0)
High dosage	The dosing frequency was too short	25(48.1)
	The dose given was high	22(42.3)
	The duration of drug therapy was long for a given condition	5(9.6)
Non-compliance	The drug product was not available for the patient	15(48.4)
	The patient didn't understand the instruction	5(16.1)
	The drug product was too expensive for the patient	4(12.9)
	The patient couldn't swallow or self administer the drug product	3(9.7)
	The patient was taking drugs which were not prescribed	3(9.7)
	The patient prefered not to take the medication	1(3.2)

Among study participants 32(12.5%) of patients were needed $FeSO_4$ and/or folic acid to be added on their therapeutic regimen. Twenty four (9.3%) study participants were prescribed antimicrobials unnecessarily. Among study participants 12(4.7%) of patients had ineffective drug therapy with antimicrobials. Twenty two (8.5%) of admitted patients were prescribed antimicrobials with low dosage. Fourteen (5.5%) of admitted patients were prescribed antimicrobials with high dosage. Ten (3.9%) percent of patients were non-compliant for antimicrobials (Table 6).

Table 6: Drugs involved with individual drug-related problems among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

Drug class or drug name	Need additional drug therapy No_(%)	Unnecessary drug therapy No_(%)	Ineffective drug therapy No_(%)	Low dosage No_(%)	High dosage No_(%)	Non-compliance No_(%)
Antimicrobials	17(6.6)	24(9.3)	12(4.7)	22(8.5)	14(5.5)	10(3.9)
ACE inhibitors	25(9.7)	2(0.8)	-	9(3.5)	-	2(0.8)
$FeSO_4$ and/or folic acid	32(12.5)	1(0.4)	1(0.4)	3(1.2)	-	1(0.4)
Beta blockers	11(4.3)	4(1.6)	8(3.1)	-	-	-
Corticosteroids	-	2(0.8)	1(0.4)	3(1.2)	9(3.5)	1(0.4)
Diuretics	6(2.3)	-	2(0.8)	1(0.4)	2(0.8)	8(3.1)
Salbutamol	-	8(3.1)	9(3.5)	-	-	1(0.8)
Amlodipine	2(0.8)	-	5(1.9)	1(0.4)	6(2.3)	-
Laxatives	-	1(0.4)	-	1(0.4)	11(4.3)	5(1.9)
Digoxin	-	-	-	2(0.4)	4(1.6)	-
Pethidine	-	1(0.4)	3(1.2)	-	2(0.8)	-
Acid secretion inhibitors	-	4(1.6)	-	-	-	-
Aspirin	3(1.2)	-	-	-	-	1(0.4)
Diclofenac	-	-	1(0.4)	-	1(0.4)	-
Oral hypoglycemic agents	1(0.4)	-	-	1(0.4)	-	-
Anticoagulants	1(0.4)	-	-	1(0.4)	-	-
Hydralazine	2(0.8)	-	-	-	-	-
Pyridoxine	3(1.2)	-	-	-	-	-
Hyoscine	-	-	-	-	-	1(0.4)
Lovastatine	-	-	-	-	-	1(0.4)

Predictors of having drug-related problems

Among socio-demographic variables patients sex and age were the only variables to have statistically significant association with drug-related problems with P-values 0.024 and 0.036, respectively (Table 7).

Table 7: Effect of socio-demographic variables on having drug-related problem among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Drug related problems		**Significance**	**COR(95%CI)**
		Yes	No		
Sex	Male	92(35.8%)	44(17.1%)	0.024*	1
	Female	97(37.7%)	24(9.4%)		1.933(1.089-3.429*)
Age of patients				0.036*	1.019(1.001-1.037*)
Educational status	Illitrate	125(48.6%)	36(14.0%)		1
	Only read and write	3(1.2%)	2(0.8%)	0.368	0.432(0.069-2.686)
	Primary 1st cycle	18(7.0%)	6(2.3%)	0.774	0.864(0.319-2.338)
	Primary 2nd cycle	16(6.3%)	8(3.1%)	0.243	0.576(0.228-1.454)
	Seconadry school	18(7.0%)	10(3.9%)	0.133	0.518(0.220-1.222)
	Post secondary	9(3.5%)	6(2.3%)	0.134	0.432(0.144-1.295)
Marital status	Married	148(57.6%)	48(18.7%)		1
	Single	26(10.1%)	19(7.4%)	0.018	0.444(0.226-0.872)
	Divorced	1(0.4%)	0(0.0%)		
	Widowed	14(5.4%)	1(0.4%)	0.149	4.541(0.582-35.437)
Occupation	Farmer	66(25.7%)	26(10.1%)		1
	Daily labourer	12(4.7%)	2(0.8%)	0.281	2.364(0.495-11.296)
	Trader	12(4.7%)	2(0.8%)	0.281	2.364(0.495-11.296)
	Government employee	17(6.6%)	5(1.9%)	0.601	1.339(0.448-4.006)
	House wife	55(21.4%)	17(6.6%)	0.502	1.275(0.628-2.588)
	Student	12(4.7%)	12(4.7%)	0.047	0.394(0.157-0.988)
	Others	15(5.8%)	4(1.6%)	0.521	1.477(0.448-4.869)
Family size of respondents	≤ 5	99(38.5%)	40(15.6%)		1
	> 5	90(35.0%)	28(10.9%)	0.361	1.299(0.741-2.276)

- COR-crude odds ratio, CI-confidence interval, *statistically significant
- Others: tureta, no work, house rent and supported by children

Non of the variables from previous history of chronic illness were found to affect the presence of drug related problems significantly (Table 8).

Table 8: Effect of previous history of diagnosed chronic illness on having drug-related problems among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Drug related problems		**Significance**	**COR**
		Yes	No		**95% CI**
History of chronic illness	Yes	66(25.7%)	15(5.8%)	0.05	1.896 0.993-3.619
	No	123(47.9%)	53(20.6%)		1
Type of chronic illness before admission	Hypertension	6(7.4%)	3(3.7%)		1
	Diabetus mellitus	6(7.4%)	3(3.7%)	1.000	1.000 0.141-7.099
	Heart disease	21(25.9%)	2(2.5%)	0.105	5.250 0.706-39.029
	Renal disease	12(14.8%)	0(0.0%)		
	TB	13(16.1%)	5(6.2%)	0.766	1.300 0.231-7.315
	HIV/AIDS	4(4.9%)	1(1.2%)	0.600	2.000 0.150-26.734
	Hypertension + renal disease	3(3.7%)	1(1.2%)	1.000	1.500 0.106-21.312
	Asthma	1(1.2%)	0(0.0%)		
Taking drugs for the chronic illness	Yes	48(59.3%)	10(12.3%)		1
	No	18(22.2%)	5(6.2%)	0.638	0.750 0.225-2.496
Attending follow up clinic	Yes	42(51.9%)	9(11.1%)	0.792	1.1671 0.370-3.678
	No	24(29.6%)	6(7.4%)		1
Discontinued drug therapy for chronic illness	Yes	23(28.4%)	1(1.2%)	0.059	7.488 0.925-60.602
	No	43(53.1%)	14(17.3%)		1
Who orderd discontinuation of drug therapy	Prescriber	2(8.3%)	0(0.0%)		
	Self	21(87.5%)	1(4.2%)		
Admission followed drug discontinuation	Yes	14(58.3%)	1(4.2%)		
	No	9(37.5%)	0		

- COR-crude odds ratio, CI-confidence interval

Social drug use, self-medication experience and advice on both prescription and non-prescription drugs had no statistically significant effect on the occurence of drug-related problems among hospitalized patients (Table 9).

Table 9: Effect of social drug use, self-medication experience and advice or councelling on prescription and non-prescription drugs on having drug-related problems among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Drug related problem		**Significance**	**COR 95%CI**
		Yes	No		
Smoking	Yes	8(3.1%)	3(1.2%)	0.950	0.958 0.247-3.719
	No	181(70.4%)	65(25.3%)		1
Alcohol use	Yes	4(1.6%)	3(1.2%)	0.329	0.468 0.102-2.149
	No	185(72.0%)	65(25.2%)		1
Kat chewwing	Yes	50(19.5%)	24(9.3%)	0.169	0.659 0.364-1.193
	No	139(54.1%)	44(17.1%)		1
Self medication experience	Yes	142(55.3%)	52(20.2%)		1
	No	47(18.3%)	16(6.2%)	0.826	1.076 0.561-2.061
Drug type used for self medication	NSAIDs and paracetamol	138(71.1%)	51 (26.3%)	0.729	1
	Antibiotics	4(2.1%)	1(0.5%)		0.676 0.074-6.196
Advise or counselling on self medication	Yes	125(64.4%)	49(25.3%)		1
	No	17(8.8%)	3(1.5%)	0.218	0.450 0.126-1.605
Advise or counselling on prescription drugs	Yes	188(73.1%)	68(26.5%)		
	No	1(0.4%)	0		

- COR-crude odds ratio, CI-confidence interval

Continued

		Drug related problem		Significance	COR 95%CI
		Yes	No		
Points on which patients got advise or councelling	how to take medications	69(26.9%)	29(11.3%)		1
	adverse drug reactions and how to take medications	56(21.9%)	11(4.3%)	0.055	2.140 0.982-4.660
	adverse drug reactions,managment of missed dose and how to take medication	32(12.5%)	15(5.9%)	0.776	0.897 0.423-1.900
	managment of missed dose and how to take medication	29(11.3%)	12(4.7%)	0.970	1.016 0.456-2.262
	Adverse drug reactions which requires prescribers visit	1(0.4%)	1(0.4%)	0.545	0.420 0.025-6.95
	management of missed dose	1(0.4%)	0(0.0%)		

- COR-crude odds ratio, CI-confidence interval

Among 190 patients whose renal function test was done, it was not possible to measure the weight of 28 patients. Seven (2.7%) study participants did not have drug therapy.

There were a statistically significant association between drug-related problems and length of hospital stay, number of diagnosed diseases, whether or not organ function test done, average number of drugs per day and clinically significant drug-drug interactions with a P-value of 0.015, 0.000, 0.039, 0.002 and 0.005 respectively (Table 10).

Table 10: Hospital identified predictors of drug-related problems development among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Drug related problems		Significance	COR(95%CI)
		Yes	No		
Length of hospital stay	≤ 7days	116(45.2%)	53(20.6%)	0.015*	1
	> 7days	73(28.4%)	15(5.8%)		2.224(1.168-4.232*)
Type of diagnosed disease	Cardiovascular	26(10.1%)	10(3.9%)		1
	Infectious	37(14.4%)	21(8.2%)	0.399	0.678(0.274-1.675)
	Hematologic	9(3.5%)	5(1.9%)	0.583	0.692(0.186-2.577)
	diabetus melitus	2(0.8%)	2(0.8%)	0.371	0.385(0.048-3.113)
	Gastrointestinal	9(3.5%)	3(1.2%)	0.851	1.154(0.258-5.153)
	cardiovascular + any additional diagnosis	82(31.9%)	18(7.0%)	0.217	1.752(0.720-4.267)
	infectious + any non-cardiac diagnosis	18(7.0%)	5(1.9%)	0.604	1.385(0.405-4.738)
	Others	6(2.3%)	4(1.6%)	0.460	0.577(0.134-2.485)
Number of diagnosed disease	One	36(14.0%)	29(11.3%)	0.000*	0.316(0.173-0.578*)
	Two or more	153(59.5%)	39(15.2%)		1
Organ function test done	Yes	149(58.0%)	45(17.5%)	0.039	1
	No	40(15.6%)	23(8.9%)		0.525(0.285-0.968*)
Type of organ function test	Renal function	83(42.8%)	24(12.4%)	0.644	1.171(0.598-2.293)
	Liver function	4(2.0%)	0		
	Renal and liver function	62(32.0%)	21(10.8%)		1
Creatinine clearance(ClCr)	ClCr< 15ml/minute	9(5.6%)	0		
	15ml/minute≤ ClCr<30ml/minute	17(10.5%)	3(1.8%)	0.269	2.102(0.563-7.848)
	30ml/minute≤ ClCr<60ml/minute	42(25.9%)	6(3.7%)	0.056	2.592(0.974-6.920)
	ClCr≥60ml/minute	62(38.3%)	23(14.2%)		1
Organ function considered for drug prescribing	Yes	131(67.5%)	44(22.7%)	0.086	1
	No	18(9.3%)	1(0.5%)		6.046(0.784-46.609)
Average number of drugs/day	< 5	141(56.4%)	63(25.2%)	0.002*	1
	≥ 5	44(17.6%)	2(0.8%)		9.830*(2.311-41.815)
Clinically significant	Yes	41(16.4%)	1(0.4%)	0.005*	18.222*(2.453-135.382)
Potential drug-drug interaction	No	144(57.6%)	64(25.6%)		1

- Others: paraplegia, chronic obstructive plumonary disease,?GBS+epilepsy,failure to walk,malnutrition,paraparesis+urine retention+bowel incontinence,adult onset malnutrition+azotemia, nephritic syndrome(2),R/o septic arthritis
- COR-crude odds ratio, CI-confidence interval, *statistically significant

Females were 1.95 times more likely to have drug-related problems than males (AOR=1.951(1.022-3.725)). For each additional year increase in age drug-related problems are more likely to increase by 1.02 times (AOR=1.021(1.001-1.041)). Patients who took greater than or equal to five drugs per day on average were 5.23 times more likely to have drug-related problems than patients who took less than five drugs per day on average (AOR=5.230(1.151-23.753)). The odds of drug-related problems were 15.5 times higher among patients who had clinically significant potential drug-drug interaction in drug therapy regimen than patients who didn't have clinically significant potential drug-drug interaction in drug therapy regimen (AOR=15.503(2.004-119.914). Length of hospital stay, number of diagnosed diseases and whether or not organ function test done were not found to affect drug-related problems significantly after adjusted for other variables (Table 11).

Table 11: Predictors of drug-related problem among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Drug related problems		**COR**	**AOR**
		Yes	No	**95% CI**	**95%CI**
Sex	Male	92(35.8%)	44(17.1%)	1	1
	Female	97(37.7%)	24(9.4%)	1.933	1.951
				1.089-3.429*	1.022-3.725*
Age				1.019	1.021
				1.001-1.037*	1.001-1.041*
Length of hospital stay	≤ 7days	116(45.2%)	53(20.6%)	1	1
	> 7days	73(28.4%)	15(5.8%)	2.224	1.606
				1.168-4.232*	0.787-3.279
Number of diagnosed disease	One	36(14.0%)	29(11.3%)	0.316	0.531
				0.173-0.578*	0.269-1.049
	Two or more	153(59.5%)	39(15.2%)	1	1
Organ function test done	Yes	149(58.0%)	45(17.5%)	1	1
	No	40(15.6%)	23(8.9%)	0.525	0.710
				0.285-0.968*	0.348-1.452
Average number of drugs/day	< 5	141(56.4%)	63(25.2%)	1	1
	≥ 5	44(17.6%)	2(0.8%)	9.830	5.230
				2.311-41.815*	1.151-23.753*
Clinically significant Potential drug-drug interaction	Yes	41(16.4%)	1(0.4%)	18.222	15.503
				2.453-135.382*	2.004-119.914*
	No	144(57.6%)	66(25.6%)	1	1

- COR-crude odds ratio,AOR-adjusted odds ratio, CI-confidence interval, *statistically significant

Patients who had previous history of chronic illness were 2.37 times more likely to have additional drug therapy need than patients who didn't have previous history of chronic illness (AOR= 2.370(1.316-4.269)). Patients who had only one diagnosed disease were 61.1% less likely to have additional drug therapy need than patients who had two or more diagnosed disease (AOR=0.389 (0.192-0.778)). Patients who took five or more drugs per day were 62.0% less likely to have additional drug therapy need (AOR=0.380(0.175-0.822)) (Table 12).

Table 12: Predictors of additional drug therapy need among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Need additional drug therapy		**COR**	**AOR**
		Yes	No	**95%CI**	**95%CI**
Sex	Male	47(18.3%)	89(34.6%)	1	1
	Female	56(21.8%)	65(25.3%)	1.631	1.580
				0.987-2.697	0.920-2.712
Age				1.007	1.005
				0.995-1.034	0.988-1.023
Previous history of	Yes	44(17.1%)	37(14.4%)	2.358	2.370
				1.377-4.037*	1.316-4.269*
chronic illness	No	59(23.0%)	117(45.5%)	1	1
Length of	≤ 7 days	63(24.5%)	106(41.2%)	1	1
hospital stay	> 7 days	40(15.6%)	48(18.7%)	1.402	1.621
				0.831-2.365	0.904-2.906
Number of	One	15(5.8%)	50(19.5%)	0.355	0.389
diagnosed				0.186-0.674*	0.192-0.788*
disease	Two or more	88(34.2%)	104(40.5%)	1	1
Organ	Yes	78(30.4%)	116(45.1%)	0.978	1.222
function test				0.547-1.749	0.643-2.324
done	No	25(9.7%)	38(14.8%)	1	1
Average	< 5	85(34.0%)	119(47.6%)	1	1
number of	≥ 5	15(6.0%)	31(12.4%)	0.677	0.380
drugs/day				0.344-1.332	0.175-0.822*
Clinically	Yes	17(6.8%)	25(10.0%)	1.024	0.984
significant				0.521-2.013	0.449-2.156
potential drug-drug interaction	No	83(33.2%)	125(50.0%)	1	1

- COR-crude odds ratio,AOR-adjusted odds ratio, CI-confidence interval, *statistically significant

Patients who took five or more drugs per day on average were 5.96 times more likely to have unnecessary drug therapy than patients who took less than five drugs per day on average (AOR=5.963(2.611-13.621)). Clinically significant potential drug-drug interaction was not

found to affect unnecessary drug therapy significantly, after adjusted for other variables (Table 13).

Table 13: Predictors of unnecessary drug therapy among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Unnecessary drug therapy		**COR**	**AOR**
		Yes	No	**95%CI**	**95%CI**
Sex	Male	27(10.5%)	109(42.4%)	1	1
	Female	20(7.8%)	101(39.3%)	0.799	0.763
				0.422-1.514	0.379-1.535
Age				0.994	0.990
				0.976-1.014	0.967-1.013
Length of	≤ 7 days	30(11.7%)	139(54.1%)	1	1
hospital stay	> 7 days	17(6.6%)	71(27.6%)	1.109	0.691
				0.573-2.147	0.325-1.468
Number of	One	12(4.7%)	53(20.6%)	1.016	1.513
diagnosed				0.491-2.099	0.659-3.475
disease	Two or more	35(13.6%)	157(61.1%)	1	1
Organ	Yes	38(14.8%)	156(60.7%)	1	1
function test	No	9(3.5%)	54(21.0%)	0.684	0.629
done				0.311-1.507	0.264-1.495
Average	< 5	27(10.8%)	177(70.8%)	1	1
number of	≥ 5	20(8.0%)	26(10.4%)	5.043	5.963
drugs/day				2.480-10.255*	2.611-13.621*
Clinically	Yes	14(5.6%)	28(11.2%)	2.652	1.718
significant				1.263-5.566*	0.704-4.193
Potential drug-drug interaction	No	33(13.2%)	175(70.0%)	1	1

- COR-crude odds ratio,AOR-adjusted odds ratio, CI-confidence interval, *statistically significant

Patients who stayed for more than 7 days in hospital were 3.32 times more likely to have ineffective drug therapy than patients who stayed for 7 or less days (AOR=3.323(1.412-7.821)). Patients who took five or more drugs per day on average were 3.92 times more likely to have ineffective drug therapy than patients who took less than five drugs per day on average (AOR=3.905(1.529-10.058)). Considering organ function tests for drug prescribing and clinically significant potential drug-drug interaction were not found to affect ineffective drug therapy significantly, after adjusted for other variables (Table 14).

Table 14: Predictors of ineffective drug therapy among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Ineffective drug therapy		**COR**	**AOR**
		Yes	No	**95%CI**	**95%CI**
Sex	Male	17(6.6%)	119(46.3%)	1	1
	Female	25(9.7%)	96(37.4%)	1.823	2.053
				0.931-3.570	0.881-4.786
Age				1.015	1.000
				0.995-1.034	0.974-1.026
Length of hospital stay	≤ 7 days	14(5.5%)	155(60.3%)	1	1
	> 7 days	28(10.9%)	60(23.3%)	5.167	3.323
				2.547-10.482*	1.412-7.821*
Number of diagnosed disease	One	6(2.3%)	59(23.0%)	0.441	0.979
				0.177-1.100	0.240-2.645
	Two or more	36(14.0%)	156(60.7%)	1	1
Organ function test done	Yes	36(14.0%)	158(61.5%)	1	1
	No	6(2.3%)	57(22.2%)	0.462	0.542
				0.185-1.154	0.194-1.516
Organ function tests considered for drug prescribing	Yes	28(14.4%)	147(75.8%)	1	1
	No	8(4.1%)	11(5.7%)	3.818	2.210
				1.410-10.341*	0.690-7.075
Average number of drugs/day	< 5	22(8.8%)	182(72.8%)	1	1
	≥ 5	20(8.0%)	26(10.4%)	6.364	3.921
				3.061-13.229*	1.529-10.058*
Clinically significant potential drug-drug interaction	Yes	12(4.8%)	30(12.0%)	2.373	1.420
				1.095-5.142*	0.470-4.286
	No	30(12.0%)	178(71.2%)	1	1

- COR-crude odds ratio,AOR-adjusted odds ratio, CI-confidence interval, *statistically significant

Patients whose organ function tests were not considered for drug prescribing were 8.50 times more likely to have inappropriate dosage than patients whose organ function tests were considered for drug prescribing (AOR=8.498(1.632-44.250)). Patients who took five or more drugs per day on average were 2.71 times more likely to have inappropriate dosage than patients who took less than five drugs per day on average (AOR=2.708(1.004-7.303)). Patients who had clinically significant potential drug-drug interaction in drug therapy regimen were 4.40 times more likely to have inappropriate dosage than patients who didn't have potential drug-drug interaction in drug therapy regimen (AOR=4.403(1.556-12.456)). Length

of hospital stay, number of diagnosed disease and creatinine clearance between 15ml/minute or more and 30ml/minute were not found to affect inappropriate dosage significantly, after adjusted for other variables (Table 15).

Table 15: Predictors of inappropriate dosage among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Inappropriate dosage		**COR**	**AOR**
		Yes	No	**95%CI**	**95%CI**
Sex	Male	43(16.7%)	93(36.2%)	1	
	Female	42(16.4%)	79(30.7%)	1.150	1.040
				0.683-1.193	0.468-2.312
Age				1.004	1.003
				0.998-1.020	0.977-1.030
Length of	≤ 7 days	44(17.1%)	125(48.6%)	1	1
hospital stay	> 7 days	41(16.0%)	47(18.3%)	2.478	1.504
				1.442-4.260*	0.685-3.304
Number of	One	11(4.3%)	54(21.0%)	0.325	0.466
diagnosed				0.160-0.661*	0.164-1.322
disease	Two or more	74(28.8%)	118(45.9%)	1	1
Organ function	Yes	69(26.8%)	125(48.6%)	1	1
test done	No	16(6.3%)	47(18.3%)	0.617	0.742
				0.326-1.168	0.351-1.570
Creatinine	ClCr< 15ml/minute	5(3.1%)	4(2.5%)	2.685	2.074
clearance(ClCr)				0.668-10.800	0.409-10.511
	15ml/minute≤	13(8.0%)	7(4.3%)	3.989	1.146
	ClCr<30ml/minute			1.430-11.131*	0.235-5.590
	30ml/minute≤	18(11.1%)	30(18.5%)	1.289	0.926
	ClCr<60ml/minute			0.614-2.706	0.360-2.377
	ClCr≥60ml/minute	27(16.7%)	58(35.8%)	1	1
Organ function	Yes	53(27.3%)	122(62.9%)	1	1
tests considered	No	16(8.2%)	3(1.6%)	12.277	8.498
for drug				3.432-43.916*	1.632-44.250*
prescribing					
Average number	< 5	54(21.6%)	150(60.0%)	1	1
of drugs/day	≥ 5	31(12.4%)	15(6.0%)	5.741	2.708
				2.878-11.451*	1.004-7.303*
Clinically	Yes	31(12.4%)	11(4.4%)	8.037	4.403
significant				3.779-17.091*	1.556-12.456*
potential drug-	No	54(21.6%)	154(61.6%)	1	1
drug interaction					

- COR-crude odds ratio,AOR-adjusted odds ratio, CI-confidence interval, *statistically significant

Non of the independent variables included in the current study was found to have statistically significant association with non-compliance (Table 16).

Table 16: Predictors of non-compliance among medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

		Non-compliance		**P-value**
		Yes	No	
Sex	Male	16(6.2%)	120(46.7%)	0.877
	Female	15(5.8%)	106(41.3%)	
Age		-	-	0.481
Length of hospital stay	≤ 7 days	19(7.4%)	150(58.4%)	0.576
	> 7 days	12(4.7%)	76(29.5%)	
Number of diagnosed disease	One	8(3.1%)	57(22.2%)	0.944
	Two or more	23(8.9%)	169(65.8%)	
Organ function test done	Yes	21(8.2%)	173(67.3%)	0.285
	No	10(3.9%)	53(20.6%)	
Average number of drugs/day	< 5	23(9.2%)	181(72.4%)	0.256
	≥ 5	8(3.2%)	38(15.2%)	
Potential drug-drug interaction	Yes	5(2.0%)	37(14.8%)	0.915
	No	26(10.4%)	182(72.8%)	

Clinically significant potential drug-drug interactions

Among 257 patients 42(16.3%) had clinically significant potential drug-drug interaction with in prescribed drugs. A total of 51 potential drug-drug interaction which fulfill the definition for clininically significant potential drug-drug interaction were identified. Among the identified potential drug-drug interactions rifampin-doxycycline interaction was expected 9 times (Table 17).

Table 17: Clinically significant potential drug-drug interactions from medical ward patients in Jimma University Specialized Hospital, from February 5, 2011-March 21, 2011.

Potentially interacting drugs	**Frequency**	**Possible out come of interaction**
Rifampin-doxycycline	9	Marked reduction in doxycycline levels
Enalapril-spironolactone	8	Hyperkalemia
Rifampin-corticosteroids	6	Decrease the effectiveness of corticosteroids
Iron-doxycycline	5	Decreased doxycycline and iron effectiveness
Rifampin-fluconazole	5	Decreased fluconazole concentration and antifungal activity
Rifampin- efavirenz	5	Rifampicin reduces the AUC of efavirenz by about 25%.
Furosemide-gentamicin	3	Increased gentamicin plasma and tissue concentration and additive ototoxicity and/or nephrotoxicity
Spironolactone-NSAIDs	2	Reduced diuretic effectiveness, hyperkalemia or possible nephrotoxicity
Spironolactone-digoxin	2	Digoxin toxicity
Antacid-ferrouse gluconate	1	Decreased absorption of iron
Ciprofloxacin-diclofenac	1	Increased ciprofloxacin plasma concentration. Convulsion,rare.
Isoniazid-phenytoin	1	Increased risk of phenytoin toxicity
Nevirapin-fluconazole	1	Double the exposure to nevirapine
Rifampin-quinine	1	6-fold increase in clearance of quinine
Rifampin-warfarine	1	Markedly reduced anticoagulant effect

8. Discussion

The presence drug-related problems among hospitalized patients is associated with different reasons and risk factors. Identifying these factors is crucial for prevention and control of DRPs in an individual patient. Small number of studies from developed and middle income countries had identified the different classes of drug-related problems (DRPs), the drugs involved with the respective class, the reasons and risk factors associated with DRPs.

The current study showed that 73.5% of patients admitted to internal medicine ward with in the study period had DRPs which was lower than what was found in Norway (81%)[4] and the internal medicine ward of one of the largest hospitals in Jordan (98.3%)[14]. The difference might be due to the exclusion of adverse drug reaction by the current study and dependency of DRP identification on national drug list which may be expected to be lower in number and variety for Ethiopia than Jordan and Norway. The inclusion criteria of the study from Jordan which only include high risk groups might also widen the gap from the present study. The addition of need for laboratory tests, patient education required and information/therapy discussion as DRPs by the Norwegian study might icreased the prevalence in Norway.

Indication related problems (47.5%) which include need additional drug therapy (32.6%) and unnecessary drug therapy (14.9%) were the leading DRPs identified. Effectiveness related problems (27.2%) which include ineffective drug therapy (13.3%) and low dosage (13.9%) were the second prevalent groups of DRPs. Safety related problems include adverse drug reactions and high dosage. But, because of limitation of the current study it was assigned only for high dosage. Safety related problems (high dosage) account 15.5% of the total identified problems. Similarly, indication related problems(need additional drug therapy (34.5%) and unnecessary drug therapy(14.3%)) followed by effectiveness related problems (inappropriate drug (18.4%) and underdosage (15.0%)) were found to be a leading type of DRPs from a study in Spain although the study was done on DRPs at discharge[8]. From a study done in Jordan[14], the common DRPs were efficacy related problems (30.66%), safety related problems (24.97%), indication related problems (16.44%) and patient related problems (15.27%) in decreasing order of prevalence which was different from our study result. This difference might be due to the difference in the study population where high risk populations like patients suffering from higher number of medical conditions, receiving higher number of medications, patients with acute conditions requiring frequent monitoring, receiving high-

alert medications or medications with narrow therapeutic index were studied in Jordanian study. A study from Brazil[15] found effectiveness (53.2%), necessity (25.2%) and safety (21.6%) related problems with decreasing order of prevalence, although the study population used and the study design were quite different from the present study. Non-compliance was found to be the least frequent problem (9.8%) among all DRPs in admitted patients in Jimma University Specialized Hospital medical ward which was similar with other studies done elsewhere[4,8,14,16]. The close supper vision by health professionals might lead to this low prevalence of non-compliance among hospital admitted patients.

Among study participants 40.1% had need additional drug therapy. Need additional drug therapy was mostly due to a medical condition that requires initiation of drug therapy (43.1%). The other reasons identified were preventive drug therapy required to reduce risk of developing a new condition or progression of the exsting condition (41.4%) and to attain synergistic or additive effects (15.5%). Untreated indication and patient requires additional/combinational therapy were found to be a leading reason for need additional drug therapy from studies done in Jordan[14] and Spain[8]. Anemia, congestive heart failure and community acquired pneumonia were the common disorders which need initiation of drug therapy, prevention of disease progression and synergistic or additive effect by additional drug therapy, respectively.

In the current study 18.3% of admitted patients had unnecessary drug therapy. Invalid indication for the drug therapy (61.7%) and multiple drug products used for a condition that need a single drug therapy (38.3%) were reasons for unnecessary drug therapy. This finding was similar to a study from Jordan[14]. Treatment duplicity was found to be a reason for unnecessary drug therapy by a study done in Spain[8]. Antibacterias like ceftriaxone were drugs prescribed with out indication. The addition of intravenous cimetidine on oral omeprazole and the combined use of oral and inhalation salbutamol were the common multiple drug product use while a single drug therapy was sufficient.

Ineffective drug therapy was identified in 16.3% of study participants. Ineffective drug therapy was mostly due to the drug was not the most effective for the medical condition (71.4%) and the dosage product was inappropriate (16.7%). The rest of ineffective drug therapies were due to the reasons medical condition was refractory to a drug (7.1%) and there was another drug which can target multiple conditions (4.8%). Similar studies from Jordan[14]

and Australia[16] found the reasons availability or recommendation of more effective drugs and wrong dosage form for efficacy related problems, respectively.

In the present study 33.1% of admitted patients had inappropriate dosage(14.0% low dosage, 16.0% high dosage and 3.1% had both low and high dosages). Low dosage was mostly due to the reasons the dose given was low (41.7%) and potential drug-drug interaction which might decrease the concentration of a drug (39.6%). The other reasons for low dosage were the dosing frequency was too infrequent to produce the desired response (16.7%) and the duration of drug therapy was short to produce the desired response (2%). Similarly, study done in Jordan[14] found low dose, inappropriate frequency, drug-drug interactions and short duration to be reasons for low dosage which was in agreement with the current finding except for low number of drug-drug interactions which decrease concentration of drugs. This difference might be due to differences in facilities of the hospitals like availability of drug interaction checker and the prevalence of tuberclosis and HIV/AIDS which drug therapies increase drug-drug interactions. Eventhough the set up was different a medication review study from Australia[16] had mentioned low dose given as a reason for under dosage.

High dosage drug therapy was due to the reasons dosing frequency was too short (48.1%), the dose given was high (42.3%) and the duration of drug therapy was long for a given condition(9.6%). The current out come was similar to findings from the study in Jordan[14]. Dose too high was found to be a reason for over dosage by study from Australia[16] although the population used were different.

In the current study 12.1% of admitted patients were non-compliant.The most frequent reason for non-compliance was found to be the inavailability of drug product for the patients (48.4%) which might be due to lack of follow up that will make sure whether the drugs were available for patients especially for those drugs which were stocked out from inpatient pharmacy and poor communication between the prescribers, nurses and dispensers.

Drugs most often involved with need additional drug therapy were $FeSO_4$ and/or folic acid, ACE-inhibitors and antimicrobials. In the current study 12.5%, 9.7%, 6.6% of admitted patients needed $FeSO_4$ and/or folic acid, ACE-inhibitors and antimicrobials, respectively. ACE-inhibitors were involved with additional drug therapy need in similar study[14]. Anemia was also found to be disease which most frequently not managed by a study from Jordan[14].

This three classes of drugs were more needed as additional drug therapy because of giving less emphasis for patients hemoglobine and hematocrite laboratory values, increased number of cardiovascular and infectious disease patients among study populations. The Norwegian study[4] found calcium and analgesics as drugs mostly involved with additional drug therapy need. This difference might be due to the average age and sex of most of the study population which were 70.8 years and female in Norwegian study while it were 40.9 years and male in the current study. In the present study 9.3%, 3.1%, 1.6% and 1.6% of patients were unnecessarily prescribed antimicrobials, salbutamol, beta blockers and acid secretion inhibitors, respectively. Antibiotics, β_2 agonists and acid secretion inhibitors were drug classes found to be involved with unnecessary drug therapy by a study from Jordan[14]. Acid secretion inhibitors were involved with unnecessary drug therapy in study from Australia[6].

The present study showed that 4.7%, 3.5% and 3.1% of admitted patients had ineffective drug therapy which involve antimicrobials, salbutamol and beta blockers, respectively. Selection of antibiotics with similar receptors and mechanism of resistance to treat a disease which doesn't respond for the first antibiotics and empirical therapy with narrow spectrum antibiotics lead to increased involvment of antimicrobials. Salbutamol tablet was considered to be less effective but more toxic than salbutamol puff and atenolol was not proved to reduce progression of heart failure, morbidity or mortality because of these reasons the two drugs were more common. The involvement of beta blockers and antibacterials in ineffective drug therapy was also found by similar studies [4,6,14].

In current study 8.5% and 3.5% of admitted patients were prescribed antimicrobials and ACE-inhibitors with low dosage, respectively. On the other hand, 5.5%, 4.3% and 3.5% of admitted patients were prescribed antimicrobials, laxatives and steroids with high dosage, respectively. The involvement of antimicrobials, ACE-inhibitors and steroids in inappropriate drug dosage was also found by similar studies[4,14]. The Australian community based study was also found ACE-inhibitors involvement with wrong dose[6].

In the present study 3.9%, 3.1% and 1.9% of admitted patients were non-compliant for antimicrobials, diuretics and bisacodyl, respectively. Spironolactone was a duiretic for which the patients were not compliant because it were stocked out during most of the data collection period from inpatient pharmacy. Non-compliance to antimicrobials were due to not knowing how to take and difficulty of swallowing. Generally, antimicrobials, among which antibiotics

were the most important, were involved with all types of DRPs which was similar to a result from Norwegian study which states that antibiotic users have more DRPs than non-users[11].

In the current study; female sex (AOR=1.951, 95%CI (1.022-3.725)), age (AOR=1.021, 95%CI (1.001-1.041)), taking five or more drugs on average per day (polypharmacy) (AOR=5.230, 95%CI (1.151-23.753)) and having clinically significant potential drug-drug interaction (AOR=15.503, 95%CI (2.004-119.914)) were found to be independent predictors which increase the chance of having DRPs. Number of medications were also found to be risk factors by similar studies[4,11,14]. However, sex and age were not found to affect DRPs in other studies[4,14,19]. This difference might be due to the poor economic power of females in Ethiopia which might made female patients to come to hospital after multiple disorders were developed which might lead to multiple diagnosis and polypharmacy. The mean age of the current study participants, which was 40.9 years, while 30(11.7%) were aged more than 65 years show the age diversity of study participants. This diversity might result to the statistical significance of age.The current study did not consider potential drug-drug interactions as a component DRPs like other studies because drug-drug interaction may increase or decrease concentration which were included in inappropriate dosage or may enhance toxicity. Other variables studied by the current study showed no statistically significant effect on the occurence of DRPs.

In the current study previous history of chronic illness (AOR=2.370, 95%CI (1.316-4.269)), having only one diagnosed disease (AOR=0.389, 95%CI (0.192-0.788)) and polypharmacy (AOR=0.380, 95%CI (0.175-0.822)) were independent predictors of need additional drug therapy when predictor varaibles were analysed for individual class of DRPs. Chronic medical conditions and number of clinical/pharmacological risk factors were found by similar studies to affect need additional drug therapy[4,14].

Polypharmacy (AOR=5.963, 95%CI (2.611-13.621)) was found to be the only independent predictors of the occurence of unnecessary drug therapy which was in agreement with similar studies[4,11,14,17]. Length of hospital stay (AOR=3.323, 95%CI (1.412-7.821)) and polypharmacy (AOR=3.921, 95%CI (1.529-10.058)) were found to be independent predictors of ineffective drug therapy. The statistical significant effect of polypharmacy on ineffective drug therapy was also found by similar study[4].

Considering organ function tests for drug prescribing (AOR=0.118, 95%CI (0.023-0.613)), polypharmacy (AOR=2.708, 95%CI (1.004-7.303)) and potential drug-drug interaction (AOR=4.403, 95%CI (1.556-12.456)) were independent predictors for inappropriate dosage (high dosage or low dosage). The statistically significant effect of polypharmacy on inappropriate dosage was in agreement with similar studies[4,11,14]. But, the effect of potential drug-drug interaction on inappropriate dosage were not studied by similar studies reviewed by the current study since other studies considered drug-drug interactions as one class of DRPs. Non of the variables studied by the current study were found to affect compliance of hospitalized patients.

In the current study drugs having clinically significant potential drug-drug interactions were prescribed for 42(16.3%) of patients. The current result was lower than out comes from studies done in Mexico[20], Netherlands[21] and Switzerland[22] which had found 80%, 27.8% and 1.11 per patient, respectively. The difference might be due to the inclusion of only clinically significant potential drug-drug interactions and the definition setted for clinically significant drug-drug interaction by the current study. The current out come was in contrary to the conclusion reached by a study on drug-drug interaction from Denmark[23] which states 'Although potential drug-drug interactions are highly prevalent, serious and clinically significant interactions are rare among recently hospitalised patients'. The high number of clinically significant potential drug-drug interaction might be due to high prevalence of tuberculosis and HIV/AIDS. Most of the interactions were due to rifampin which was a known enzyme inducer.

Limitation of the study

Adverse drug reaction which is one major component of drug-related problems was not studied in the current study because of lack of experienced data collectors in identification of ADR and shortage of laboratory services. Cost of drug therapy were not considered during DRP identification. The identification of DRPs was made only by a principal investigator. The laboratory data for complete blood count were not enough to differentiate anemia of chronic illness from iron deficiency anemia. Patients were not asked about the currently settled diagnosis and their current condition. From all patients admitted during the study period five patients were not included in the study. Three were discharged before their document was cross checked and two were died before interview. Lack of studies from developing countries made discusion and comparisons difficult.

9. Conclusions

The prevalence of drug-related problems was substantially high (73.5%). Furthermore, all classes drug-related problems were common. A medical condition that requires initiation of drug therapy and preventive drug therapy required to reduce risk of developing a new condition or progression of the exsting condition were more common reasons for need additional drug therapy. Invalid indication for the drug therapy was the most frequent reason for unnecessary drug therapy. The drug was not the most effective for the medical condition was the leading reason for ineffective drug therapy. The presence of low dose prescribing and drug interaction which might decrease the concentration of a drug were more common reasons for low dosage. Short dosing frequency and high dose prescribing were common reasons for high dosage. Inavailability of drug product was the most common reason for non-compliance. Clinically significant drug-drug interactions were more common among admitted patients with in the study period.

Antimicrobials were mostly involved with all types of DRPs. ACE-inhibitors were involved with need additional drug therapy and low dosage. $FeSO_4$ and/or folic acid was the involved with need additional drug therapy. Beta blockers were involved with need additional drug therapy, unnecessary drug therapy and ineffective drug therapy. Salbutamol were involved with unnecessary drug therapy and ineffective drug therapy. Anti-tuberculosis drugs were involved with most of the clinically significant potential drug-drug interactions.

Among all independent variables sex, age, taking five or more drugs per day on average during hospital stay (polypharmacy) and potential drug-drug interaction were found to be independent risk factors for DRPs with in the study period. Polypharmacy was found to affect unnecessary drug therapy, ineffective drug therapy and inappropriate dosage with in the study period. Previous history of chronic illness and number of diagnosed diseases were independent risk factors which affected need additional drug therapy with in the study period. Hospital stay for more than seven days were found to affect ineffctive drug therapy with in the study period. Clinically significant potential drug-drug interaction were affecting inappropriate dosage with in the study period.

10. Recommendations

The current study showed how significant number of hospital admitted patients was affected by drug-related problems. Since the presence of DRPs will affect the patient care service negatively, prevention and management of DRPs has undeniable importance. The following recommendations are forwarded to decrease DRPs among admitted patients.

1. For Jimma University Specialized Hospital

- For a better delivery of health services with regard to patient care and management clinical pharmacists should be assinged to internal medicine wards. Clinical pharmacist being a member in a patient managing team at least reduce DRPs among admitted patients by prevention whenever possible or early identification and management of DRPs working together with the other team members.

2. For clinical pharmacists and other health professionals

- The laboratory findings and vital signs of patients should be thoroughly observed for prevention of DRPs and to make dose adjustments based on organ function tests.
- Female patients, patients who take five or more drugs per day and patients with two or more diagnosed diseases should be given the priority for clinical pharmacy service in internal medicine ward.
- Drug therapy regimens which contain anti-tuberculosis drugs should be evaluated for clinically significant drug-drug interactions.

3. For researchers

- A future study should investigate risk factors for DRPs by using probabilistic sampling and the impact of clinical pharmacy services on clinical out come of patients in internal medicine ward by cohort or radomized controlled studies.

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Annex: Questionnaire

JIMMA UNIVERSITY

COLLEGE OF PUBLIC HEALTH & MEDICAL SCIENCE

POST GRADUATE SCHOOL

DEPARTMENT OF PHARMACY

QUESTIONNAIRE FOR PATIENT INTERVIEW

INTRODUCTION AND INFORMED CONSENT FORM FOR THE CLIENT:

Greeting

Hello! my name is ----------I am working in research team of Jimma University College of Public health &Medical Science Post Graduate School. This is a study to be conducted with objective of assessing the drug-related problems that occur in patient care services. As the study is directly related to patients seeking in patient care in internal medicine ward**.**You are one of the candidates who are selected to participate in this study, therefore your are kindly requested to participate in this study and provide the information required from you.

Your participation in this study is completely on voluntary bases**.** I am going to ask some very personal question and you have the right to refuse from participation. Your response will be kept confidential and there will be no way of linking your individual responses to the final result of the study findings.

I would like to inform you that the responses that you provide for the questions are very essential, not only, for the successful accomplishment of the study but also for producing relevant information which will be helpful in improving hospitalized patients care services.

Would you willing to participate in this study?

Yes ----------

No ----------.

If the patient says no, thank the patient and go to the next patient.

Name of interviewer---------- Sign ---------- Date of interview----------

Name of the supervisor ---------- Sign ---------- Date of interview----------

I. SOCIO-DEMOGRAPHICS AND ECONOMICS CHARACTERISTICS OF RESPONDENTS

1.1. Study ID code.....

1.2. Sex 1. Male 2. Female

1.3. Age .....

1.4. Educational status 1. Illitrate 2. Only read and write

3. Primary cycle (1-4)
4. Primary 2nd cycle (5-8)
5. Secondary school(9-12)
6. Post secondary school.

1.5. Marital status 1. Married 2. Single

3. Divorced 4. Widowed

1.6.What is your occupation 1. Farmer 2. Daily labourer

3. Trader 4. Government employee

5. House wife 6. Student

7. Private institution worker 8. Others.....

1.7. How many family members do you have (including your self)?.....

II. PAST MEDICAL HISTORY

2.1. Do you have chronic illness diagnosed in the past?

1. Yes 2. No

2.2. If yes for Q 2.1 what is the chronic illness the patient had?

1. Hypertension 2. Diabetus mellitus 3. Cardiac diseases

4. Liver disease 5. Chronic renal failure

6. TB 7. HIV

8. Others.....

2.3. Do you take drugs for the management of the chronic illness? If no skip to Q3.1.

1. Yes 2. No

2.4. If yes for Q2.3 please, tell/ show the drugs/ me the name of the drugs you are taking.
.....
.....
.....

2.5. are you currently attending follow-up clinic for the chronic illness?

1. Yes 2. No

2.6. If yes for Q 2.5 when is the last time the follow-up is done? .....

2.7. Have you discontinued the drug therapy for your chronic illness?

1. Yes 2. No

2.8. If yes for question 2.7 who ordered the discontinuation of drug therapy?

1. prescriber 2. Self 3. Others.....

2.9. Did your admission follow discontinuation of the drug therapy?

1. Yes 2. No

2.10. If yes for Q2.7 please, mention the drugs you have discontinued before admission?

.....
.....

III. SOCIAL DRUG USE

3.1. Do You smoke cigarette? If no skip to Q3.4.

1. Yes 2. No

3.2. How many cigarettes per day do you smoke?.....

3.3. For how many years do you smoke?.....

3.4. Do you drink alcohol?

1. Yes 2. No

3.5. Do you chew chat?

1. Yes 2. No

IV. MEDICATION HISTORY

4.1. Do you have self-medication experience? If No skip to Q 4.5.

1. Yes 2. No

4.2. If yes for Q4.1 which drugs you use for self medication?

1. NSAIDs 2. Antibiotics 3. Dermatologicals 4. Cardiovascular drugs 5.Others .....

4.3. If you use antibiotics for self medication which antibiotics you use more frequently? .....

4.4. Had you recieved an advise or counselling on self medications you were taking?

1. Yes 2. No

4.5. Had you recieved an advise or counselling on prescription drugs you are/were taking?

1. Yes 2. No

4.6. If yes for Q 4.4/Q 4.5 in which of the following points you had recieved advise?

1. Tolerable side effects of drugs
2. Adverse drug reactions which requires prescribers visit
3. Management of missed dose
4. How to take the medication?
5. others .....

V. DRUG-RELATED PROBLEM EVALUATION QUESTIONS

5.1. Do you take the medication as indicated by the prescriber?

1. Yes 2. No

5.2. Are drugs prescribed for the patient, the drugs taken by the patient and the drug administration chart consistent?

1. Yes 2. No

5.3. If no for Q5.1/5.2 what is the possible reason for noncompliance?

1. The patient does not understand the instruction.

2. The patient prefers not to take the medication.

3. The patient forgets to take the medication.

4. The drug product is too expensive for the patient

5. The patient cannot swallow or self- administer the drug product appropriately.

6. The drug produt is not available for the patient.

7. Others .....

DATA EXTRACTION FORMATS FOR PATIENT CARD REVIEW

I. CURRENT DIAGNOSIS OF THE PATIENT

1. Weight of the patient.....
2. Length of hospital stay.....
3. Diagnosis of the patients condition.

   .....

   .....

   .....

4. Data Extraction format for patients laboratory results

Name of lab diagnosis		Done(yes or no)		Result
Liver function test	SGOT			
	SGPT			
Renal function test	Serum creatinine			
	Blood urea nitrogen			
Lipid profile test	Total cholestrol			
	LDL			
	HDL			
	Triglyceride			
Complete blood count	Hemoglobine			
	Hematocrite			
	RBCs			
Blood sugar level	Random blood glucose			
	FBG			
CD4 count				
Other laboratory values				

5. Data extraction format for patients vital signs

Name of vital sign	Results
Blood pressure	
Pulse rate	
Rispiratory rate	
Temperature	

6. Data extraction format for drugs prescribed after admission of the patient.

Date	Drug name	Dose	route	frequency	Number of drug/day	Potential drug interaction

Date	Drug name	Dose	route	frequency	Number of drug/day	Potential drug interaction

DRUG-RELATED PROBLEM EVALUATION TOOL

1. Do Organ function tests performed?

1. Yes 2. No

2. If yes for question 1 which tests are performed?

1. Renal function 2. Liver Function 3. Others

3. Does drug prescribing considered the organ function tests?

1. Yes 2. No

4. If No for question 3 mention the drug and the error observed.

.....

.....

.....

5. Is there clinically significant potential drug-drug interaction identified?

1. Yes 2. No

6. Mention drugs which have potential interaction and the possible result of the interaction.

.....

.....

.....

7. Is there unnecessary drug therapy in the patient?

1. yes 2. No

8. If yes for Q 7 what is the reason of unnecessary drug therapy?

1. Invalid indication for the drug therapy at this time.

2. Multiple drug products used for a condition that need a single drug therapy.

3. The medical condition is self-limiting

4. Drug therapy is used to treat an avoidable adverse drug reaction associated with another drug.

5. Others.....

9. Write the drug which is unnecessarily prescribed and the cause.

.....

.....

10. Is there a need for additional drug therapy?

1. Yes 2. No

11. If yes for Q10 what is the reason for additional drug therapy need?

1. A medical condition that requires initiation of drug therapy.

2. Preventive drug therapy required to reduce risk of developing a new condition.

3. To attain synergistic or additive effects.

4. Others.....

12. Write the indication for additional drug therapy and the drug required.

.....

.....

13. Is there ineffective drug use in the pharmacotherapy?

1. Yes 2. No

14. If yes for Q13 what is the reason of ineffective drug selection?

1. The drug is not the most effective for the medical problem.

2. The medical condition is refractory to a drug.

3. The dosage form of the drug produt is inappropriate

4. Others .....

15. Write the ineffective drug selected and the respective cause.

.....

.....

16. Is the dosage for drug therapy inappropriate?

1. Yes 2. No

17. If yes for Q 16 what is the reason for inappropriate dosage?

1. The dose give is low
2. The dose given is high
3. The dosing frequency is too infrequent to produce the desired response.
4. The dosing frequency is too short.
5. There is a drug interaction which increase the concentration of a drug.
6. There is a drug interaction which decrease the concentration of a drug.
7. The duration of drug therapy is long for a given condition.
8. The duration of drug therapy is short to produce the desired response.
9. Others.....

RAKKOOLEE DHUNFAA QORICHAAN WALQABATANII DHUFAN KAN DHUKUBSATOOTA IRRAA ITTIIN GAAFATAN.

Seensafi Eeyyama namootaa gaafiifi deebii waliin gaggeeffamu.

Nagaa gaafachuu

Maqaan koo ---------- jedhama. Kan hojjedhu garee qo'annoo yuuniversitii Jimmaatti koolleejjii fayyaa hawaasaaf saaynsii wal'aansaa, mana barumsa digrii lammaaffaa.

Kaayyoon qo'annoo kanaa rakkinoota qorichaan wal-qabatanii dhukkubsatoota irratti muldhatan qo'achuuf ta'a

Qo'annoon kun dhukkubsattoota irratti kan gaggeeffamu waan ta'eef isinilleen sababa kanaaf filatamtan. Kana hubachuun odeeffannoo isin irraa barbaannu akka nuuf kennitan kabajaan isin gaafanna.

Hirmaannaan keessan guutummaa guututti fedhii keessan iratti kan hundaayee dha. Gaaffillee dhimma dhuunfaa keessan ilaallatu waan isin gaafachuu barbaanuuf, yoo deebii kennuuf hin feene taate diduu nidandeessu.

Deebiin isin nuuf kennitan iccitidhan kan qabannuuf bu'aa qo'annoo kan waliin akka dhuunfaatti kan wal hin qabannee ta'uu isin beeksifina

Deebiin isin gaaffilee keenyaaf laattan daran barbaachisadha. Kunis qo'annoo kana xumruuf qofa osoo hin taane odeffannoo bu'uuraa kan tajaajila waldhaansaa fayyaa dhukkubsatootaaf hospitaala keessatti kennamu cimsuudhaaf gahee ol'aanaa waan qabuufi .

Kanaafuu odeeffannoo kanarratti hiiraachuu barbaaduu ?

1. Eeyyee 2. Miti

Dhukkubsatichi Miti yoo jedhe,galateeffadhuu kan itti aanutti darbi

Maqaa gaafataa ----------Mallattoo----------Guyyaa---------

Maqaa too'ata ---------- Mallatto----------Guyyaa ---------

I. <u>Odeefaanoo waa'ee dhimmoota hawaasummaaf diinagdee deebi kennitootaa ilaallatan.</u>

1.1 Koodii qo'annoo ----------

1.2 Saala 1. Dhiira 2. Dubara

1.3 Umrii-------

1.4 Sadarkaa barnootaa -------

1. Kan takkaa hin baranne
2. Dubbisuuf barreesuu qofa kan danda'u /tu
3. Sadarkaa tokkoffa (1-4)
4. Sadarkaa 1^{ffaa} fi jiddu galeessa 2^{ffaa}(5-8)
5. Sadarka 2^{ffaa} (9-12)
6. Dipiloomaaf sanaa oli

1.5 Haala fudhaaf heerumaa

1. Ken fuudhe / kan heerumte
2. Kan hinfuune / kan hin heerumne
3. Kan addaabahan
4. Kan jalaa due

1.6 Hojiin keessan;

1.Qotee bulaa 2. Hojjataa guyyaa

3. Daldalaa 4. Hojjataa mootummaa

5. Haadha manaa 6. Barataa/tuu

7. Hojjataa waajjira dhuunfaa 8. Kanbiraa_____

1.7 Baayy'ina maatii keessanii isin dabalatee meeqa _____

II. <u>Seenaa waldhaansaa kanaan duraa</u>

2.1 Kanaan dura dhibeelee yeeroo dheeraaf nama waliin turanni dhukkubsattanii woldhaansa argattanii beektuu?

1. eeyyee 2. Miti

2.2 Yoo deebii keessaa gaafii 2.1f eeyyee ta'e, dhibeeleen yeroo dheeraaf nama waliin turan kan isaa kami?

1. Dhibee dhiibbaa dhiigaa 2. Dhukkuba sukkaaraa

3. Dhukkuba onnee 4. Dhukkuba Tiruu

5. Dhukkuba kale (Chronic renal failures) 6. Dhibee sonbaa

7. HIV/AIDS (eedsii)

8.Kanbiraa_____

2.3. Dhukuba dheeraaf qoricha gahaa ta'ef fudhateta?

1. eeyyee 2. Miti

2.4 Yoo deebii keessan gaafii 2.3f eeyyee ta’e maqaa qoricha himi.
.....
.....

2.5. Dhukkuba kanaaf waldhaansa hordofaa turtanii?

1. eeyyee 2. Miti

2.6. Yoon Deebiin keessan gaafii lakk 2.5 fi eeyyee ta’e hordofiin yaalaa yeeroo dhumaatiif isinii godhame yoomi. .....

2.7. Qoricha guyya hanga isiniif kennameen duratti osoon hin fixatin addaan kuttanii beektuu?

1. Eeyyee 2. Miti

2.8. Gaaffii 2.7 fi deebiin keessan eeyee yoo ta’e eenyutuu akka addaan kuttan isin gorse?

1. Nama isiniif ajaje 2. Ofiin 3. Kan biraa .....

2.9 Ciisichaaf as seenuun keessaniif sababa kan ta’u, qoricha addaan kutuu kessan ta’a jettanii ni yaaduu?

1. Eeyyee 2. Miti.

2.10. Gaaffii 2.7 fi deebiin keessan eeyee yoo ta’e, qorichi isin ciisichaan dura addaan kuttan maqaan isaa?
.....
.....

III. SOCIAL DRUG USE

3.1 Tamboo ni xuuxxuu? Yoo deebiin keessan miti ta’e gara gaaffi 3.4 tti darbaa?

1. Eeyyee 2. Miti

3.2 Yoo deebii keessan gaafii lakk 3.1fi Eeyee jettan guyyatti tamboo (sijaaraa) meeqa xuuxxu? _____

3.3 Yoo deebii keessan gaafii lakk 3.1fi eeyyee jettan waggaa meeqaaf xuuxxan? _____

3.4 Dhugaatii nama macheessan dhugduu? 1. Eeyyee 2. Miti

3.5. Jimaa(caatii) ni qaamtuu? 1. Eeyyee 2. Miti

IV. SEENAA WALDHAANSAA

4.1 Muuxannoo ofiin of waldhaanuu qabduu? 1. Eeyyee 2. Miti

4.2 Gaafii 4.1 oliif deebiin keessan “Eeyee” yoo ta’e, qorichaa kam fayyadamtan?

1. Qoricha Alarjii(NSAIDS) 2. Qoricha farra baakteeriyaa (Antibiotics)

3. Qoricha gogaa (Dermatologicals)

4. Qoricha dhukkuba onne (cardiovascular drugs)

5. Kan biraa .....

4.3. Qoricha farra baakteeriyaa (Antibiotics) kan ofiin waldhaantan isa kam yeroo baay’ee fayyadamtan? .....

4.4. Qoricha ofiin of waldhaanuuf fudhattaniif qaama biroo irraa gorsa fudhattanii turtanii?

1. Eeyyee 2. Miti.

4.5. Qoricha Haakiminii isinii ajajee fudhataa jirtaniif ykn turtaniif gorsa argatanii jirtuu?

1. Eeyee 2. Miti

4.6. Gaafiiwwan 4.4 fi 4.5 deebiin keessan eeyee yoo ta’e, waa’ee kam kam irratti gorsa fudhattan?

1. Rakkinoolee miidhaa cimaa hin finne irratti.

2. Rakkinoolee qorichi isinitti fiduufi kan gorsa haakimaa barbaachisu.

3. Hanga isiniif ajajame seeraan fudhachuu. 4. Akkaataa qorsa ittiin fudhatan

5. Kan biraa irratti _____

V. GAAFFIWWAN RAKKINOOTA QORICHAAN WAL QABATANII DHUFAN ILAALAN.

5.1. Qorichaa haala isiniif ajajameen fudhattuu?

1. Eeyyee 2. Miti

5.2.Qoricha isinii ajajame, qoricha isini fudhattanii fi chaartiin haala qoricha ittiin fudhattan ibsu waal fakkaataa?

1. Eeyyee 2. Miti

5.3.Gaaffii 5.1 fi 5.2 oliif deebiin keessan “Miti” yoo ta’e rakkoon keessan maal ture kan Qoricha seeraan hinfudhanne?

1. Dhukkubsataan ajaja seeraan hin hubanne
2. Dhukkubsataan qoricha fudhachuu hin feene
3. Dhukkubsataan qorichaa fudhachuu dagatan
4. Gatiin qorichaa dhukkubsataan bituudhaaf baay’ee mi’aa dha
5. Dhukkubsataan qorichaa ajajameef liqimsuu ykn ofiin fudhachuu hindanda’u
6. Qoricha dhukkubsataaf barbaachisu hin argamu
7. Kan biraa _____

በጅማ ዩኒቨርሲቲ

የሕብረተሰብ ጤናና ሕክምና ሳይንሶች ኮሌ□

ድህረ ምረቃ ት/ቤት

የፋርማሲ ትምህርት ክፍል

□ህመማን ቃለ ምልልስ መ□ይቅ

መግቢያና የህመማን የፍቃደኛነት መጠየቂያ ቅፅ

ጤና ይሥጥልኝ

እንዴት ነህ/ነሽ □ኬ.....እባላለሁ፡፡ በጅማ ዩኒቨርሲቲ የሕብረተሰብ ጤና እና የሕክምና ሳይንሶች ኮሌጅ ድሕረ ምረቃ ት/ቤት የምርምር ሰብስብ ወሥጥ አባልነኝ፡፡ ይሔ ጥናት የሚሠራ□ ሆስ□ታል □ስ□ □ዙ□ኙ ህመማን የሚያጋጥማቸዉን መድሃኒት ጋር የተያያዙ ችግሮችና ምክኒያታቸዉን ለማጥናት ነዉ፡፡

ጥናቱ ተኝተዉ የሚታከሙ ሁሙማን የሚመለከት ስለሆነ እርሶ አንዱ ለጥናቱ ተመራጭ ሰዉ ነዎት፡፡ ስለዚህ በጥናታች ላይ እንዲሳተፉ በክብር እንጠይቆታለን፡፡

በዚህ ጥናት ዉስጥ የሚሳተፉት ያለማንም አስገዳጅነት በፍቃደኝነት ነዉ፡፡ አንድአንድ □□ል ሂወትዎን የሚመለከት ጥያቄዎችን ልጠይቅዎት እችላለሁ እርስዎ ግን ያለመመለስ መብት አለዎት፡፡ የሚመልሱት መልስ በሚስጢር የሚያዝ ይሆናል፡፡ □እርስዎ የግል መልስ ከመጨረሻዉ ዉጤት ጋር የሚያያዘዉ መንገድ አይኖርም፡፡

ለመጠይቆቹ የሚሠጡት መልስ በጣም ጠቃሚ የሚሆነዉ ለዚህ ጥናት ብቻ ሣይሆን ተኝተዉ የሚታከሙ ህመማን ጤናና የህክምና አገልግሎት ለማሻሻል ጭምር ነዉ፡፡

በዚህ ጥናት ላይ መሣተፍ ይፈልጋሉ?

እፈልጋለሀ..... አልፈልግም.....

ህመምተኛዉ አልፈልግም ካሉ አመስናቸዉና ወደ ቀጣዩ ህመምተኛ ሒ□

□□□ቂ□ ሥም.....□ርማ.....ቃለመ□□ቁ □ዙካሄደበት ቀን.....

□ዙቆ□□ሪ□ ሥም.....□ርማ.....ቃለመ□□ቁ □ዙካሄደበት ቀን.....

I. □ተ□□ቂ□ ማህበራዊና ኢኮኖሚያዊ መገለጫዎች

1.1 □መ□□ቁ መለ□ ቁ□ር-----

1.2. □ታ 1. ወንድ 2. ሴት

1.3. □□ሜ--------

1.4. □ትምህርት ደረጃ 1 ያልተማረ 2. መፃፈና ማንበብ ብቻ የሚችል

3. □መ□መሪ□ □ር (1-4)

4. □ሁለተኛ □ር (5-8)

5. ሁለተኛ □ረ□ (9-12)

6. ከሁለተኛ □ረ□ በላ□

1.5. የጋብቻ ሁኔ□

1. □□ባ 2. □ላ□ባ

3. □ተ□ታ 4. የትዳር አጋሩን በሞ□ □□

1.6. ሥራዎ ምንድነዉ?

1. □በሬ 2. የቀን ሰራተኛ

3. ነጋዴ 4. የመንግስት ሠራተኛ

5. የቤት እመቤት 6. ተማሪ

7. የግል ድርጅት ሰራተኛ 8. ሌሎች----------

1.7.□እርስዎን ጨምሮ የቤተሠብ ቁጥር ሥንት ነዉ?----------

II. ያለፈ የህክምና ታሪ□

2.1. ለብ□ □□ □ሚቆ□ ህመምሞችን ከዚህ በፊት ታ□መ□ □ቃሉ?

1. አዉቃለሁ 2. አላዉቅም

2.2. ለ□□ቁ 2.1 አዉቃለሁ ካሉ የታከሙት ህመምዎ ምን ነበር?

1. የደም ግፊት 2. □ስኳር በሽ□ 3. □ልብ በሽታ

4. የጉበት በሽታታ 5. የኩላሊት በሽታ 6. ቲቢ

7. ኤች አይ ቪ 8. ሌሎች.....

2.3. ለህመምዎ መድሐኒት ይጠቀማሉ?

1. ***እጠቀማለሁ*** 2. ***አልጠቀምም***

2.4. **ለመጠይቅ ቁ 2.3. እጠቀማለሁ ካለ የሚጠቀሟቸዉን መድሐኒቶች ይጥቀሱልኝ።**

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2.5. ለህመምዎ ክትትል ያደርጉ ነበር?

1. አደርጋለሁ 2 አላደርግም

2.6. ለመጠይቅ ቁ 2.5. አደር□ለሁ ካለ መቼነዉ ለመጨረሻ ጊዜ ክትትል ያደረጉት?

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2.7. መድሀኒቱ እየወሰዱ ሳይጨርሱ አቁርጠዉ ያዉቃሉ?

1. አዉቃለሁ 2 አላዉቅም

2.8. አቁርጠዉ ካወቁ አንዲያቁርጡ ማን አዘዝዎት?

1. ሀኪም 2. በራሴ 3 ሌሎች

2.9.ሆስፒታል መግባትዎ መድሐኒት ማቋረጥዎን ተከትሎ የመጣ ነዉ::

1. **አዎ** 2. **አይደለም**

2.10. ለመጠይቅ ቁጥር 2.10 አዎ ካሉ ያቋረጧቸዉን መድሐኒቶች ይጥቀሱልኝ::

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III. □ማህበራዊ ሱስ □ሚ□□ሩ መድሃኒቶች አጠቃቀም

3.1 ሲጋራ ያጨሳሉ? አላጨስም ካሉ ወደ መጠይቅ 3.4 □ለል

1. አጨሳለሁ 2. አላፊ ስም

3.2. ስንት ሲጋራ በቀን ያጨሳሉ?---------

3.3 ለምን ያህል አመት አጨሰዋሉ?--------

3.4 የአልኮል መጠጦችን ይጠጣሉ?

1. እጠጣለሁ 2. አልጠጣም

3.5 ጫት ይቅማሉ?

1 እቅማለሁ 2 አልቅምም

IV. **የመድሀኒቶች □ሪ□**

4.1. ካለ ሀኪም ትዕዛዝ መድሀኒት የመዉሰድ ልማድ አላዎት?

1. አለኝ **2.** የለኝም

4.2. ለመ□□ቅ ቁ□ር **4.1** አለኝ ካሉ ምን አይነት መድሀኒቶችን ነዉ ካለ ሀኪም ትዕዛዝ የሚጠቀሙት?

1. ህመምን ለማስታገስ የሚረዱ መድሀኒቶች **2.** አንቲባዮቴክስ(ለህመምተኛዉ ይብራራለት) **3.** □ቆ□ በሽታ ለማከም □ሚረ□ **4.** የልብና የደም ቧንቧን ለማከም □ሚረ□

5. ሌሎች.....

4.3. አንቲባዮቴክስ ካለ ሀኪምዋ ትዕ□□ □ሚ□ቀሙ ከሆነ የሚጠቀሙትን አንቲባይቴክስ □□ቀሱልን.....

4.4. ካለሀኪምዎ ትዕዛዝ ለሚወስድዋቸዉ መድሃኒቶች ምክር ተቀብለ□ □□ ቃሉ?

1. አዉቃለሁ **2.** አላዉቅም

4.5. በሀኪም ታዘልዎት ለሚወስድዋቸዉ መድሀኒቶች ምክር ተቀብለዉ ያዉቃሉ?

1. አዉቃለሁ **2.** አላዉቅም

4.6. ሥለሚወስድዋቸዉ መድሀኒቶች ምክር ከተሠጥዎ ምን አይነት ምክሮችን ነዉ ያገኙት?

1. ሊቋቋሙዋቸዉ ስለሚችሉ የመድሀኒቱ የጎንዮሽ ችግሮች::

2. ሀኪምዎ ማማከር ስለሚገባዎ የመድሀኒቱ የጎንዮሽ ጉዳቶች::

3. ሳይወስዱ ያመለጥዎትን መድሀኒት እንዴት እንደሚያስተካክሉ::

4. መድሀኒቱን እንዴት እንደሚወስዱ::

5. ሌሎች----------

V. መደሀኒት ጋር የተያያዙ ችግሮችን ማጥኛ

5.1. ሀኪምዎ እንዳዘዘሎት መድሃትዎን ይዎስዳሉ?

1. እወስዳለሁ 2 አልወስድም

5.2. ለህመምተኛ ታዘዙት በድሀኒቶች፤ ህመምተኛ እየወሰዳቸዉ ያሉት መድሀኒቶችና የመድሀኒት መስጫዉ ቻርት ይመሳሰላል?

1 ይመሳሰላል 2 አይመሳሰልም

5.3. ህመምተኛዉ መድሀኒቱን በትክክል ካልወሰደ ምክኒያቱ ምንድነዉ?

1. ህመምተኛ እንዴት እንደሚወስድ አልገባ ም::

2. ህመምተኛዉ መድሀኒቱን መዉሰድ አልፈለገም::

3. ህመምተኛዉ መድሀኒቱን መዉሰድ ረስተዋል::

4. የመድሀኒቱ ዋጋ ለህመምተኛዉ በጣም ዉድ ነዉ::

5. ህመምተኛዉ መድሀኒቱን መዋጥ ወይንም በራሰ በትክክል መዉሠድ አይችልም

6. መድሀኒቱ ለህመምተኛዉ አልቀረበለትም::

7. ሌሎች.....