ASSESSMENT OF WARD BASED CLINICAL PHARMACY SERVICES IN JIMMA UNIVERSITY SPECIALIZED HOSPITAL: THE CASE OF INTERNAL MEDICINE

BY

ALEMAYEHU BERHANE (B.Pharm)

A THESIS SUBMITTED TO THE SCHOOL OF GRADUTE STUDIES OF JIMMA UNIVERSITTY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN CLINICAL PHARMACY

JUNE, 2011

JIMMA, ETHIOPIA

ASSESSMENT OF WARD BASED CLINICAL PHARMACY SERVICES IN JIMMA UNIVERSITY SPECIALIZED HOSPITAL: THE CASE OF INTERNAL MEDICINE

BY

ALEMAYEHU BERHANE (Bpharm)

ADVISORS:

SULTAN SULEMAN (B.Pharm, Msc, PhD fellow)

ELIAS ALI (MD)

PEGGY ODEGARD (PharmD, CDE)

JIMMA, ETHIOPIA

ACKNOWLEDGEMENT

First and above all, I wish to express my deepest gratitude to my advisors Mr. Sultan Suleman, Dr. Elias Ali and Dr. Peggy Odegard for their invaluable suggestions and comments. I highly acknowledge Department of Pharmacy for doing their level best effort in the implementation of clinical pharmacy, without which I cannot think of the topic itself.

I want to thank Solomon Mekuanint (Bpharm, Phd fellow) and Dr. Belete Hone (Internist), Jimma University for judging the clinical importance of interventions made.

My special thanks goes to Dr. Getahune Asres, department of epidemiology, University of Gondar who acquaintance me how to do qualitative research.

My sincere goes to the entire personnel of the department of pharmacy, Jimma University, for the friendly atmosphere, which has made this work so enjoyable. I am very grateful to Aserat Agalu, Assefa Mulu, Leggesse Chelkaba, Bayew Tsega, Gebrehiwot Teklay and Tesfahun Chanie for fruitful discussions during my studies and for their kind help in practical aspects and in many other kinds of problems encountered during these years. At the same time, my special thanks go to other clinical pharmacy postgraduate II students with whom I designed the pharmaceutical care record.

I want to thank my many colleagues for sharing ideas about clinical pharmacy service with me. I also want to thank Belyanew Dagne (B.pharm) who introduced me a lot to the hospital atmosphere. I want to thank Biksegn Aserat (Nurse Head of internal medicine) and those of the residents and medical interns assigned to Internal Medicne, Jimma University Specialized Hospital for providing an inspiring working atmosphere.

Jimma University is gratefully acknowledged for the financial support.

ABSTRACT

Background: Patient centered clinical pharmacy practice has developed internationally to expand the role of a pharmacist well beyond the traditional roles of compounding, dispensing and supplying drugs though poorly developed in Africa. Thus, implementation of patient centered practice is important to consume the profession to its maximum. But, studies on the activities of the pharmacists in an inpatient ward in resource constrained setting are scarce.

Objective: To review and document the existing pharmaceutical service and assess the implementation process of ward based clinical pharmacy services in internal medicine ward of Jimma University Specialized Hospital.

Methods: Cross sectional study was conducted from March to April, 2011 at Jimma University Specialized Hospital. In-depth interview, self administered questionnaire and prospective observation study methods were utilized. An exploratory study was conducted using in-depth, one-on-one interviews. Responses were recorded either by note taking or audiotapes or both. Physicians' expectations of clinical pharmacists' roles were assessed through self administered questionnaires. Clinical pharmacy interns providing inpatient pharmaceutical care to patients in the internal medicine ward over a 2 month period were prospectively observed. Interventions optimizing rational drug use and their acceptance were recorded. Clinical significance of interventions were evaluated by an independent team and recorded. Results of the study were organized in the form of findings, themes, and percentages.

Results: Physicians' expectations of clinical pharmacists' roles was higher with a mean value between agree and neutral. They expect more as clinical pharmacists are knowledgeable drug therapy experts. A total of 149 drug related problems (DRPs) were identified. Among which clinical pharmacists intervened on 133 DRPs. The most frequent DRP underlying interventions were unnecessary drug therapy 36(24.2%), needs additional drug therapy 34(22.8%) and noncompliance 29(19.5%). The most frequent intervention type was change of dosage/instruction for use, 23(15.4%). Acceptance rate was 68.4%. Interventions with clinical significance, 46(49.5%) and 25(26.9%) had major and moderate clinical importance respectively. All interviewees indicated implementation of clinical pharmacy service is a must.

Conclusion: Implementation of clinical pharmacy services is feasible.

Keywords: Clinical Pharmacy, Pharmaceutical Care, Ward-based Pharmacy, Jimma University Specialized Hospital.

Table of Contents

ACKNOWLEDGEMENT I
ABSTRACT II
ACRONYMS AND ABBREVIATIONS IV
DEFINITION OF TERMS VI
LIST OF TABLES VII
LIST OF FIGURES VIII
CHAPTER ONE 1
Introduction 1
1.1 Background 1
1.2 Statement of the Problem 5
CHAPTER TWO 7
Literature Review 7
CHAPTER THREE 11
Significance of the Study 11
CHAPTER FOUR 12
4. Objectives 12
4.1 General Objective 12
4.2 Specific Objectives 12
CHAPTER FIVE 13
5. Methods and Subjects 13
5.1 Study Area and Period 13
5.2 Study Design 13
5.3 Population 13
5.3.1 Source Population 13
5.3.2 Study Population 14
5.4 Sample Size Determination 14
5.5 Sampling Technique 15
5.6 Variables 15
5.6.1 Dependent Variables 15

5.6.2 Independent Variables…...……...15
5.7 Study Instruments…….……15
5.8 Data Collection Procedure……...……...16
5.9 Data Quality Assurance……..……18
5.10 Data Analysis…….……...18
5.11 Ethical Consideration……19
5.12 Operational Defintion……...…20
CHAPTER SIX.....21
6. RESULTS 21
CHAPTER SEVEN.....40
7. DISCUSSION……...…….…...40
CHAPTER EIGHT……..48
8**.** CONCLUSION and RECOMMENDATION…...…….……...48
REFERENCES 50
ANNEX I Pharmaceutical care patient record…….55
ANNEX II DRP registration form……...57
ANNEX III Questionnaire……...…60
ANNEX IV In-depth interview guide……..…….62

ACRONYMS AND ABBREVIATION

ADR	Adverse Drug Reaction
BPharm	Bachelor of Pharmacy
BPR	Business Process Reengineering
CHF	Congestive Heart Failure
DM	Diabetes Mellitus
DRPs	Drug Related Problems
EBM	Evidence Base Medicine
HCP	Health Care Provider
IM	Intramuscularly
JUSH	Jimma University Specialized Hospital
MOH	Ministry of Health
MOE	Ministry of Education
PC	Pharmaceutical Care
PCP	Primary Care Physician
PharmD	Doctor of Pharmacy
PRN	As Needed
QID	Four Times Daily
RHZE	Rifampicine Isoniazide Pyrazinamide Ethambutol
SSA	Sub Saharan Africa
SPSS	Statistical Package for Social Science
TID	Three Times Daily
TB	Tuberculosis

DEFINITION OF TERMS

Clinical pharmacy: is the work of pharmacists whose primary job is to interact with the health care team, interview and assess patients, make specific therapeutic recommendations, monitor patient responses to drug therapy and provide medicines information.

Pharmaceutical care intervention: is defined as a recommendation made by the clinical pharmacist to a healthcare professional, pertaining to drug therapy, which aimed to improve the quality of medication use

Drug related problem: is defined as an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes.

Pharmaceutical care service: is a patient centered service with a focus on identifying, resolving and preventing drug therapy problems.

Antibiotics: are agents produced from micro-organisms and active against invading micro-organisms

LIST OF TABLES

Tables Pages

Table 1. Personal information of physicians, JUSH, Ethiopia, March-April 2011 21

Table 2. Physicians' expectations of clinical pharmacists' roles, JUSH, Ethiopia, March- April 2011 22

Table 3. Characteristics of interventions documented by clinical pharmacy interns, JUSH, Ethiopia, March-April 2011 24

Table 4. Classes of drugs involved in interventions of all types, JUSH, Ethiopia, March- April 2011 25

Table 5. Types of interventions made by clinical pharmacy interns, JUSH, Ethiopia, March-April 2011 26

Table 6. Examples of interventions initiated by clinical pharmacy interns 28

Table 7. Pharmaceutical services delivered in Jimma University Specialized Hospital 39

LIST OF FIGURES

Figure 1. Acceptance rate of interventions made by clinical pharmacy interns, JUSH, Ethiopia, March - April 2011 28

Figure 2. Clinical importance of interventions made by clinical pharmacy interns, JUSH, Ethiopia, March-April 2011 39

CHAPTER ONE
Introduction

1.1 Background

Pharmacists in many countries are too few in number and trained at a critically insufficient scale. The World Health Report 2006 estimated the global health worker shortage to be 4.2 million, including more than 1 million in Sub-Saharan Africa. Fifty-Seven countries, 36 of which are in sub-Saharan Africa (SSA), have a health workforce crisis. SSA has 11 percent of the world's population, yet 24 percent of the global burden of disease and only 3 percent of the world's health workers. The human resource for health crisis is a threat to the delivery of health services and the attainment of the Millennium Development Goals. WHO guidelines recommend a ratio of 2300 persons to 1 pharmacist. Japan has 1.9 pharmacists per 1000, France 1.1 per 1000, Australia 0.88 per 1000, and USA 0.9 per 1000. In SSA, Ethiopia, for example, the density of pharmacists per 10,000 population is 0.14. Not only are pharmacists in SSA few in number, but also not necessarily equipped with resources for continuing education to keep abreast of the changes and advances in pharmacotherapy. The current developments in pharmacy practice, its diversification as well as its aspiration for increased patient orientation will have an impact on the pharmacy workforce (1).

In recent years there has been a paradigm shift in the provision of hospital pharmaceutical services (1, 2). Clinical pharmacy practice has developed internationally to expand the role of a pharmacist well beyond the traditional roles of compounding, and supplying drugs (3) to roles more directly in caring for patients and providing medication consultation to staff. The pharmacist's role has changed steadily. As automation, robotics, and computerized physician order entry are incorporated into the health care environment, the focus of pharmacy practice is turning away from dispensing functions toward greater involvement in pharmaceutical care (4).

Pharmaceutical care was emerged in the mid 1970s and takes its form as a patient care service in which the practitioner takes responsibility for all of a patient's drug related needs and is held accountable to this commitment. Increasingly, the pharmacist's task is to ensure that a patient's drug therapy is appropriately indicated, the most effective available, the safest possible, and

convenient for the patient (5, 6). Through a patient care process, pharmacists can play an important role in identifying drug therapy problems (DRPs), resolving actual DRPs and preventing potential DRPs (6, 7).

Although medications play an important role in the cure, palliation and prevention of disease, they also expose patients to drug-related problems (8).The identification and resolution of drug related problems (DRPs) are key components of the pharmaceutical care process. DRPs have been defined as events or circumstances involving drug treatment that actually or potentially interfere with the patient experiencing an optimum outcome of medical care (9*)*. Hospitalized patients are more likely exposed to polypharmacy. This in turn is a concern for potential drug related problems (10). In the United States healthcare system, drug related problems (DRP) are implicated in 16.1% of internal medicine ward hospital admissions, of which 58.9% could definitely or possibly be avoided (11). Overall, 10-30% of hospital admissions are thought to be directly related to drug related problems (DRPs) (12).

An Institute of Medicine in U.S estimated that between 44,000 and 98,000 people die each year because of medical errors. In an Australian study of 28 hospitals, adverse drug events (ADEs) occurred in 16.6% of admissions, resulting in permanent disability in 13.7% of patients and death in 4.9% (2).Various studies state that majority of DRPs could have been avoided, reporting a preventability of about 70% (8,13).

Many DRPs and aspects of suboptimal prescribing have been shown to be preventable through the process of pharmaceutical care which entails patient assessment, associated patient education and monitoring of outcomes of drug therapy (14). Clinical pharmacists have a key responsibility to respond to patient DRPs. Pharmaceutical care interventions in elderly outpatients in Brazil among 92 DRPs, solved 69% of actual DRPs and prevented 78.5% potential DRPs (15).

Documenting pharmacist's interventions enables in the identification of specific problem areas and pharmacist's impact on patient safety is emphasized (16). There is no unique way of documenting and classifying clinical pharmacists' interventions globally (16, 17, 18). The basic principles underlying a system for documenting DRPs are based on a clear definition of a DRP, a

focus on the types and management of DRPs (19). Documentation of interventions is vital in proving to hospital administration that pharmacists play an integral role in preventing medication errors and improving overall patient care (4). Implementing an institution based intervention reporting system for clinical pharmacists practicing in Jimma University Specialized Hospital is a need from the point of view of monitoring patient outcomes.

Analysis of clinical pharmacist's interventions on medication can provide both process and outcome data. Process measures provide quantitative data regarding the impact or effectiveness of systems, policies and procedures and can monitor changes overtime when measured repeatedly. Outcome measures provide quantitative data related to the outcomes of health system performance (e.g. morbidity, mortality, satisfaction with health care) (20).

Pharmaceutical care was founded out of clinical pharmacy in U.S and most European countries (21), and is now available in many parts of the world including Brazil, Chile, Spain and Australia (13). Developing countries like Pakistan, India, Bangladesh, many African countries, and parts of the Middle East are changing their entry-level qualification to a PharmD with an emphasis to develop clinical pharmacy practice (22).

However, the situation in Ethiopia was followed a long track of product oriented, chemistry oriented then product oriented pharmacy practice. Through time, pharmacy education reached the point at which patient focused pharmacy practice is the main agenda of the country. Ministry of Health (MOH) has a job description what pharmacists can do in dispensing, store management and procurement. However, recruitment of pharmacy personnel by midlevel professionals leads to wrong perception that pharmacy is saturated. Government employment rate of pharmacy personnel is decreasing and finally stopped except Oromia region. Ministry of Education (MOE) decreases intake of undergraduate students and even those allocated shifted into medicine, nurse, etc. In the mean time, the country undergoes organizational change based on the philosophy of BPR (business processing reengineering).The carrier structure developed by BPR sought pharmaceutical care implementation. Taking this into consideration, Schools of Pharmacy in Ethiopia sat together and discussed the issue in detail and agreed to follow the paradigm shift in the practice of pharmacy and integrate into their BPharm curriculum. Recently, there is a trend

shift into patient focused practice after a 5 year Bachelor of Pharmacy (B.Pharm) with a 6-month internship curriculum developed. Moreover, Department of Pharmacy of Jimma University has taken the initiative of launching postgraduate clinical pharmacy programme and become pioneer to strengthen the undergraduate patient oriented pharmacy programme. Thus, this study will be used as a baseline report of results of clinical pharmacy services in the Ethiopian context.

The positive impact of clinical pharmacist interventions on outcomes related to drug-related problems has been demonstrated in numerous studies (8-19, 23, 24, 25). Appropriate resolution of drug-related problems involves collaboration and communication between the patient, the pharmacist, and the patient's physician. Physicians' acceptance of clinical pharmacists' services depends on the value physicians attached to the service and the physicians' perception of the pharmacist's competence. It was reported that medical practitioners expect pharmacists to perform patient counseling, but pharmacists are not performing this service optimally. It was found that medical doctors in group practice settings strongly accept pharmacists who are participating in collaborative patient care. In general, it is important that pharmacists understand medical practitioners' expectations of them and how they are interested in the input that pharmacists could make to patient's care (26). Therefore, besides reporting interventions, this study will assess physicians' expectations of clinical pharmacists' roles in the implementation of ward based clinical pharmacy services.

1.2 Statement of the Problem

The pharmacy profession has evolved to the point at which clinical pharmacy with patient-focused practice is no longer the exception but the rule for most pharmacists (5). Despite of a severe shortage of pharmacists in SSA, this is the case in Ethiopia where need for pharmacists are underscored (27). Inefficient utilization of pharmacists who have taken long training and specializing in drug therapy is the other area of debate who urges the need for patient centered pharmacy practice. In Kenya, in the last ten years, the role of the pharmacist has been shifting more towards patient care as a result of the introduction of clinical pharmacy both at undergraduate and postgraduate levels. In Sudan, many pharmacists are specialized in clinical pharmacy but only two hospitals have started to implement clinical pharmacy services partly due to resistance from physicians. Despite the increase in the number of pharmacists, the development of employment in the pharmaceutical sector has not kept pace with the increase in the number of graduates (1).

The School of Pharmacy of Jimma University, Ethiopia, launched the country's first graduate programme in clinical pharmacy in 2009 G.C. The initiative was led by department of pharmacy the then School of Pharmacy in collaboration with partners from the Ethiopian Pharmaceutical Association (EPA), Management Sciences for Health (MSH), the University of Washington and Howard University. In recent years, the trend in pharmacy education and practice has been not only the provision of safe, high quality medicines but also the inclusion of the pharmacist as an active member of the patient centered health team (28). Before coming into practice, sensitization for the health care professionals regarding the unique feature of the program that would likely to add in the health care system was advocated standing on the experience of Westerns. It was developed with the aim of undergoing the current trend shift in undergraduate pharmacy curriculum from product focused service to patient centered approach. Introduction of pharmaceutical care into the new curriculum across the nation necessitates implementation of clinical pharmacy. Till now, hospital pharmaceutical services were almost entirely concerned with the preparation and dispensing of medicines, with little direct patient contact. These technical services are still fundamental to the current service and have become increasingly specialized, but they are now complemented by a wide variety of ward-based, patient-focused activities. Thus, this implementation depends up on a new teaching program comprising of the

first batch of pharmacy interns having B.Pharm and a 1 year Masters courses of clinical pharmacy. Although the importance of clinical pharmacy is widely acknowledged, the implementation of clinical pharmacy services has been slow (29). Barriers to the implementation of clinical pharmacy services have been the lack of specific training for pharmacists, the limited pharmacy manpower, the absence of financial support and the fear of poor acceptance from other health care professionals (24). Other factors such as time constraints, lack of appropriate space, patient demand, access to patient medication records and evidence of the value of clinical pharmacy services might be barriers to implementation of clinical pharmacy services (29). Clinical pharmacy services are associated with improved health and economic outcomes, a reduction in drug related adverse effects, improved quality of life, and a reduction in mortality and morbidity (5, 24). To facilitate implementation, efforts to build evidence base by evaluating the economic, clinical and humanistic outcomes of these services through quantitative research supported by qualitative data is established in Jimma University Specialized Hospital. Factors which have slowed implementation of clinical pharmacy services as well as pharmacists' areas interventions in a resource constrained setting are not well studied.

CHAPTER TWO

Literature Review

2.1 Pharmaceutical Care Services

All patient problems involving medications can be categorized into one of these seven types of drug therapy problems: unnecessary drug therapy, needs additional drug therapy, ineffective drug, dosage too low, adverse drug reaction, dosage too high, and noncompliance (6). Involvement of pharmaceutical care practitioners in patient care in the inpatient hospital setting results in safer and more effective medication use through the identification, resolution and prevention of drug therapy problems. Interacting with the health care team on patient rounds, interviewing patients, reconciling medications, and providing patient discharge counseling and follow-up all resulted in improved outcomes, such as reduced adverse drug events or medication errors; improved medication adherence, knowledge, and appropriateness; and shortened hospital length of stay (20). Pharmaceutical care services improve patient and finance outcomes and yet can be ignored by clinical experts. Prescribers should be educated about the role of pharmacists in health care decision-making. The pharmacist as an integral part of the health care team should be promoted, especially in areas of chronic diseases and emerging diseases (3).

The intervention of pharmaceutical care practitioner for a period of 12 month through randomized control trial at the geriatric unit of University Hospital of Uppsala in Sweden resulted in 80% reduction of drug related readmissions and the total cost per patient was $230 lower than compared to the control group (11). The participation of a pharmaceutical care practitioner in a geriatric hospital in Norway for 27 days during a 4 year period identifies at least one DRP in 75% of patients among which 3.2 per patient potential changes in medication was made (23). A study in New York described patients in the intervention group were more than twice as likely to have medication non adherence issues addressed (85.7% vs.40.0%), 6 times as likely to have a medication prescribed that was indicated but no prescribed previously (72.6% vs.11.5%), 10 times as likely to be prescribed an optimal medication for their medication (60.0% vs.5.9%) and 11 times as likely to have their primary care physicians (PCP) prescribe more cost effective therapies (72.1% vs. 6.5%) (30). It has also been reported that pharmaceutical care in ambulatory haemodialysis (HD) units has improved medication

adherence, provided drug information, and raised awareness of inappropriate medication and improved biochemical and therapeutic responses to medications (11). In addition, pharmaceutical care services have proven to be successful in effectively managing diseases such as hypertension and diabetes mellitus (DM), while improving quality of life for patients (31).

A report from a sample of elderly patients who received pharmaceutical care for one year at the University of Minnesota revealed that additional drug therapy was the most common DRP identified, accounting for 32% of all DRPs (13). Hypertension, DM, arthritis, chronic heart disease (CHD) and osteoporosis were the most common medical conditions requiring additional drug therapy. The majority of these were indicated to prevent the onset of a new medical condition (n = 2142 drug therapy problems, 59%). The addition of daily aspirin (n = 399 drug therapy problems,11%) to prevent myocardial infarction and/or stroke in patients with diabetes, ischemic heart disease or hypertension and the addition of calcium supplements to prevent osteoporosis (n = 327 drug therapy problems, 9%) were both common.

A study on drug therapy problems identified in a work place asthma self management program the Inspire at Work Initiative in Eastern Canada found out 46 DRPs in 34 patients among which 20 (43.5%) were untreated indications (needs additional drug therapy) (9).

A report from a sample of elderly patients who received pharmaceutical care for one year at the University of Minnesota revealed that the need to increase the dosage regimen of the patient's medication was found to be the second most frequently identified DRP category (13). In these cases, the practitioner judged the medication to be appropriately indicated, but the therapy was not being effective for that patient because the dosage being taken was not sufficient to achieve the goals of therapy. Almost 1 in 4 (n = 827 drug therapy problems, 23%) DRPs required an increase in the dosage of a medication that the patient was already taking in order to increase the likelihood of that therapy resulting in the desired outcomes. Among 1066 interventions made by a single clinical pharmacist in Belgium underuse (15.9%) was the most frequent drug related problems underlying interventions (24).

In a sample of elderly patients who received pharmaceutical care in their homes for one year, non-adherence to drug therapy was the most common DRP identified comprising 32% of all

DRPs (13). The reasons for patients' non-adherence to drug therapy were poor understanding of the disease and/or treatment, lifestyle issues and treatment anxiety.

2.2 Physicians expectations of pharmacists' roles

Physicians are generally receptive to specific clinical service provided by clinical pharmacists, such as therapeutic drug monitoring, patient counseling, and drug therapy recommendations. The level of physician acceptance of these services is found to be related to the degree of exposure physicians have to pharmacist-provided services (26, 32).

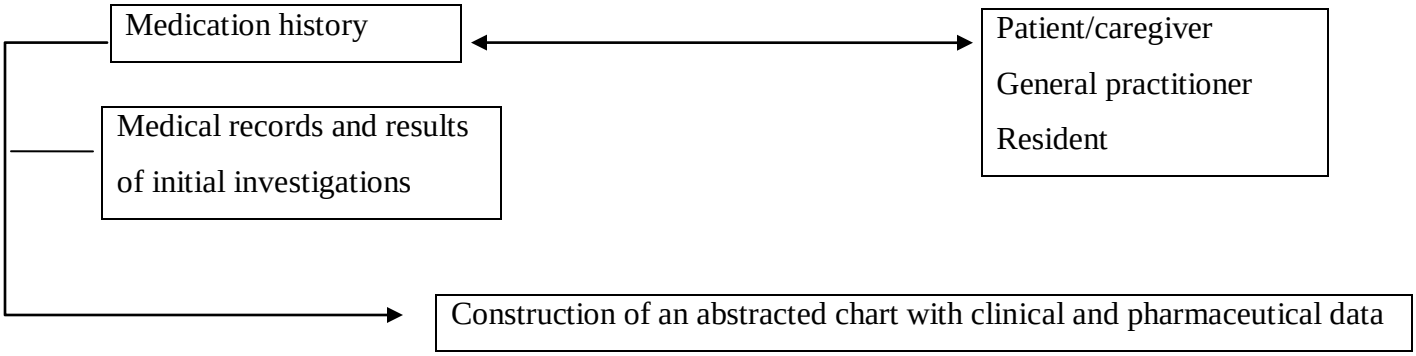
Given that prescribing is still almost exclusively in the physician's domain, the utility of pharmacists' input about managing drug therapy ultimately depends on physicians' willingness to accept it. It is important, therefore, that clinical pharmacists understand what physicians expect of them and how receptive physicians are to the contributions that pharmacists seek to make to patients' pharmaceutical care (26).

A study in California described that majority of physicians expect pharmacists as they are knowledgeable drug therapy experts. However, physicians have not clear strong expectations of how pharmacists apply that knowledge into practice to provide any of the services (32). On the other hand, physicians appeared receptive to most clinical pharmacy services played by pharmacists. However, physicians were 'uncomfortable' with pharmacists suggesting or recommending prescription medications to patients and, to some extent, the treatment of minor illness. This suggests physicians' resistance to any activity involving prescribing by pharmacists (26)

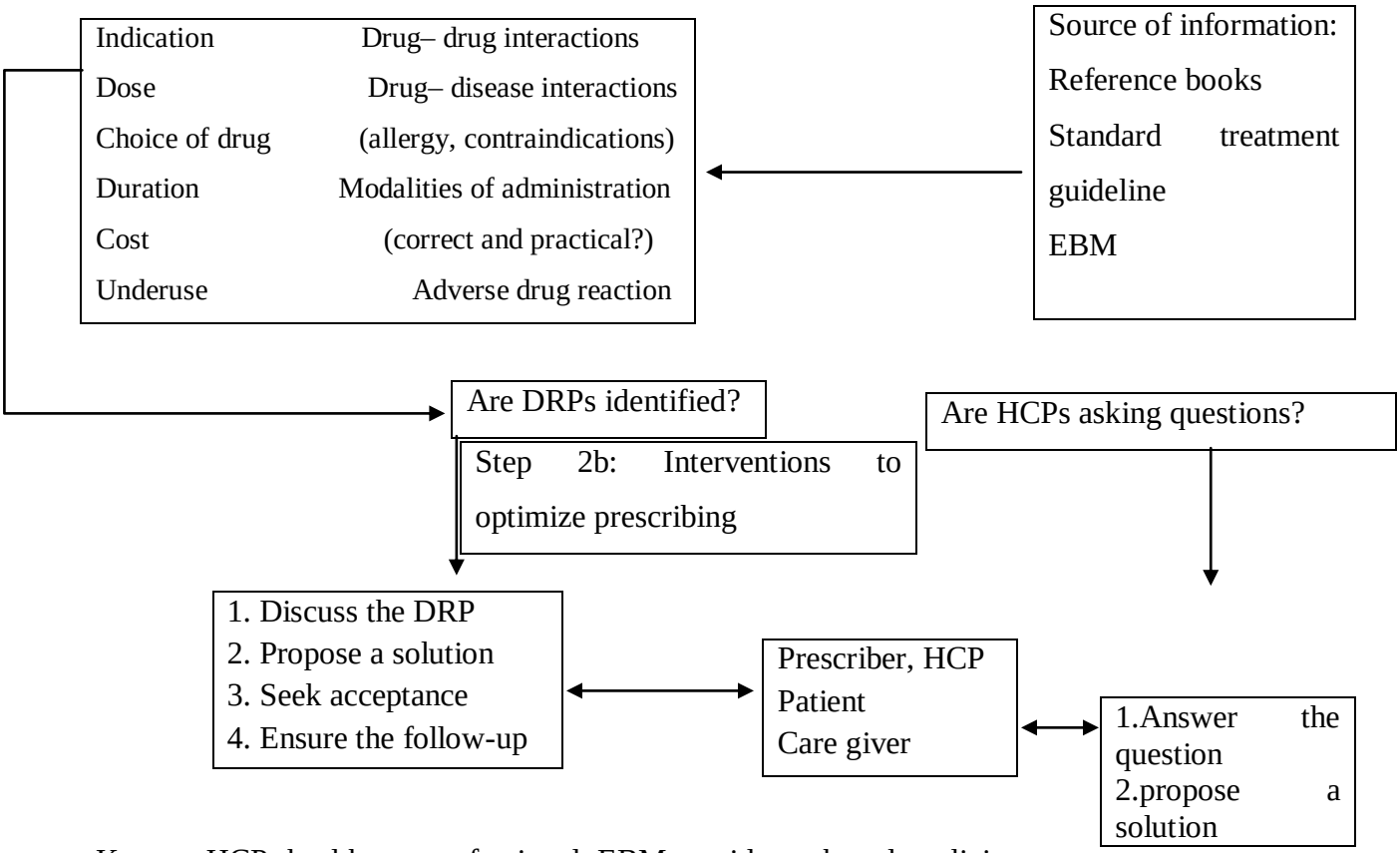
Conceptual Framework

The pharmaceutical care process used in the study looks like the following:

Step 1: Gathering relevant information on the patient on admission



Step 2–2a: Systematic analysis of drugs prescribed during hospital stay



Key: HCP- healthcare professional; EBM – evidence-based medicine

CHAPTER THREE

Significance of the Study

Clinical pharmacy postgraduate curriculum is newly introduced to Ethiopia. Clinical pharmacy interns have just begun working alongside physicians in a university teaching hospital. To date there has been no study performed in Ethiopia to lay down baseline and evaluate the roles of clinical pharmacist in improving patient safety. It is important to evaluate their influence on the health care setting in the identification and resolution of drug related problems in a resource constrained settings. Thus, reporting Ethiopian experiences enables to assess its effectiveness and benefits to patient outcome. There is a way forward "Ethiopian hospital reform implementation" as pharmacists should be assigned to hospitals to serve the patient care directly. Therefore, this study enables us in the identification of the major gap areas in the implementation of clinical pharmacy service before implementing nationally. In addition, this study may be useful to other researchers as reference while conducting further studies on similar problems.

CHAPTER FOUR

4. Objectives

4.1 General Objective

To review and document the existing pharmaceutical service and assess ward based clinical pharmacy practice in the internal medicine ward of Jimma University Specialized Hospital.

4.2 Specific Objectives

- To assess pharmacy staff, students and key informants views of the existing pharmaceutical service
- To assess the challenges and opportunities in the implementation process of clinical pharmacy
- To assess physicians' expectations of clinical pharmacy roles and services
- To assess pharmaceutical care interventions
- To document and report clinical pharmacy services
- To assess physicians acceptance of interventions
- To assess clinical importance of interventions

CHAPTER FIVE

5. Methods and Subjects

5.1 Study Area and Period

Jimma University Specialized Hospital (JUSH) is one of the oldest public hospitals in the country. It was established in 1937(1930 E.C) by Italian conquerors for the service of their soldiers. Geographically, it is located in Jimma city 350 Km southwest of Addis Ababa. Currently, it is the only teaching and referral hospital in the southwestern part of the country. The catchment population for the Jimma Zone reaches 2,788,390. But it is difficult to enumerate figures the catchment population in which Jimma University Specialized Hospital is delivering health services as it is the only referral hospital in the southern part of the country where more than 15 million people resides. It is a large teaching institution among the six federally established teaching hospitals. It provides specialized health services through its 9 medical and other clinical and diagnostic departments for approximately 9000 inpatients and 80,000 outpatients each year with bed capacity of 450 and a total of more than 550 staffs (33). There are 8 internists, 66 general practitioners, 14 Bsc nurses, 13 pharmacists, 2 pharmacy technicians working in the hospital. At the same time, there are 150 medical interns. The study was done at the internal medicine ward of Jimma University Specialized Hospital over 2 months period from March 1 to April 30, 2011. Internal medicine ward has three subsections: medical A, B, and C. Number of patients admitted per month on average reaches 60, 70 and 20 respectively.

5.2 Study Design

A cross-sectional study design was conducted through in-depth interview, self administered questionnaire and prospective observational study methods.

5.3 Population

5.3.1 Source Population

For the in-depth interview; All JUSH staff and pharmacy students.

For the self-administered questionnaire; All physicians working in JUSH.

For prospective observational study; All patients visiting JUSH, internal medicine department.

5.3.2 Study Population

For the in-depth interview; head of departments (internal medicine, nurse, pharmacy, medical director, administration) and pharmacy students' representatives.

For the self-administered questionnaire; All physicians working in JUSH.

For prospective observational study; All in-patients in the internal medicine ward whose medicine chart or prescription led to an intervention.

Inclusion criteria:

- Physicians, nurses, pharmacists, administrators and pharmacy students who provided informed consent for inclusion in the case of the in-depth interview.
- Physicians who provided informed consent for inclusion, for the self-administered questionnaire.
- All patients admitted to the medical ward and those who provided verbal consent were included in the prospective observational study.

Exclusion criteria:

- Those who did not fulfill the inclusion criteria
- For prospective observational study, the study did not include:
  - ❖ Critically ill patients
  - ❖ Patient length of stay 48 hours or less

5.4 Sample Size Determination

For the self administered questionnaire, the sample size was calculated using the following formula with the finite population correction factor

$$n = \frac{NZ^2_{\frac{1}{2}}\, pq}{d^2 (N-1) + (Z^2_{1/2} p (1-p)}$$

Where: Total population of physicians (N) =243

Proportion of good expectations (p) = 50 %(assumption)

Confidence level of 95 % chosen

Margin of error (d) = 5%

Given that n= 149, and assuming 10 % of non response rate the total sample size calculated was 169.

For the prospective observational study, all inpatients in the internal medicine ward were included.

5.5 Sampling Technique

For the self administered questionnaire, simple random sampling method was used.

For prospective observational study, a convenience sampling method was used.

5.6 Variables

5.6.1 Dependent Variables

- Drug related interventions
- Physicians' expectations of clinical pharmacists' roles
- Challenges and opportunities for the implementation process of clinical pharmacy
- Pharmacy staff, students and key informants views of the pharmaceutical service

5.6.2 Independent Variables

- Drug type
- Acceptance rate
- Clinical importance of interventions
- Age, sex, year of practice, current position
- Response

5.7 Study Instruments

- For the in-depth interview: Semi structured interview was chosen for collection of data. The design of interview was based on literature review (29). Questions were ordered so that they have a flow from one question/topic to another. Open questions encouraged interviewees to describe pharmacy department activities in the JUSH and to understood the process of clinical pharmacy service implementation. The semi structured interview was used to define the interviewee's views on the value of clinical pharmacy services. In addition, general questions about the clinical pharmacy services, the current level of involvement of pharmacists and with staff in specific pharmaceutical services. The other part of the semi structured interview assessed the challenges and opportunities of launching clinical pharmacy training programme.
- Self-administered questionnaire was used to collect data regarding physicians' expectations on the roles and services of clinical pharmacists.

- For prospective observational study: DRPs identified, resolved and prevented were recorded through DRP registration format, adapted with modification from Belgium (24).

5.8 Data Collection Procedure

For the in-depth interview: purposeful sampling method was used to identify key informants. Interviewees were chosen in advance from the following specific groups:

a. Those managing the pharmacy department
b. Those managing the nursing department
c. Those managing internal medicine
d. Those managing the hospital
e. Pharmacy student representatives (both graduate and undergraduate)

The respondents were informed about the setting of the interview and provided consent. The interview took approximately 30 minutes. They were also be given further details on the nature of the study to ensure that interviewees understood what was being required of them. All meetings took place in a private setting where the process was unlikely interrupted or overheard at the respondent's office and during office hours. For students, interviews were carried out in a quiet place too. All interviews were conducted by a single researcher. Data were collected as much as point of saturation was reached. Responses were recorded either by note taking or audiotapes or both based on informed consent. Additionally, where available, documentation was gathered to support the interview; typically this would include pharmacy practice standards, mission statements, policy and procedures etc.

To identify major gap areas in the implementation of clinical pharmacy service, a questionnaire consisting of physicians' expectations of clinical pharmacists' roles was adapted from the questionnaire used and validated for content in California (29). A set of statements of Jimma University physicians' expectations of clinical pharmacists' roles for which respondents were asked to indicate their level of agreement using a 3 point level Likert scale as agree, neutral and disagree. The questionnaire consisted of two sections: questions on personal information and physicians' expectation of pharmacists' roles. Questionnaires were distributed to 169 random sample of physicians working in Jimma University Specialized Hospital in the study period.

For prospective observational study:

Normally, patients are under the care of one attending physician and two internal medicine residents in each ward of internal medicine, JUSH. Standard practice at the ward includes daily medical rounds by the resident in charge. Students and interns also participated in daily clinical rounds. The internist/resident assessed the patients and made recommendations and the resident/intern would made changes to the prescriptions respectively according to the recommendations made and adjust drug doses.

Clinical pharmacy interns were involved in ward rounds in inpatient settings to give pharmaceutical care services according to the standards of practice. This practice process involves three major steps including assessment, development of care plan and follow-up evaluation (6).

For this study, eight clinical pharmacy interns, two for two weeks, were assigned in internal medicine ward for 2 months and participated in medical and multidisciplinary team two days per week. Ward rounds usually took place from 10:00 am to 12:00 am. At each visit, the clinical pharmacist used all relevant information about each patient which was systematically collected in the medical record: the results of examinations and laboratory results, the medical history, clinical factors, diseases, symptoms and medication history. We recognized that undertaking this activity for as many patients as possible represents a significant time consuming and needs commitment. Likewise, recording all interventions to treatment takes time. So, for the sake of this study; only those patients with DRPs, their pharmaceutical care interventions were documented. Participation with a multidisciplinary team was part of the project. Interventions made were communicated with the concerned health care professionals. Clinical pharmacy interns then documented pharmaceutical care interventions. Documentations of pharmaceutical care practices were made through pharmaceutical care patient record, which was already incorporated as patient care in patient chart. With the data collected, the pharmacist evaluated appropriateness of medical therapy, identified DRPs and communicated interventions to the internist/resident. Then the pharmacist provided written information. At discharge, the clinical pharmacy interns provided treatment change information to the patient or caregiver and the general practitioner. A written plan (including names of drugs, indications, dosages and forms,

frequency and time of administration, modalities of administration, list of drugs discontinued and reason) was given to the patient or caregiver, together with oral explanations. The further follow-up of the decisions on consequent days or after the patient's discharge from the hospital was not a part of the study.

For each patient, DRPs were recorded during each visit according to the classification system described by Pharmaceutical Care Practice: the Clinicians Guide (6). Types of interventions made and their acceptance were recorded from the pharmaceutical care patient record. To judge the relevance of interventions, an independent panel comprising of one internist and one pharmacologist rated according to their significance. Disagreements between the rates were provided for discussion to clinical pharmacy interns to come to conclusion. In addition, the following information was recorded: 1) drugs involved in DRPs; 2) diseases associated with DRPs

5.9 Data Quality Assurance

In order to assure the quality of data the following measures were undertaken:-

- Data were collected by trained health workers (pharmacists)
- Pilot interviews were conducted with one chief pharmacist and amended accordingly
- Pretesting of the questionnaire through 10 sample of physicians working in JUSH regarding their expectation of clinical pharmacist's roles and modified accordingly
- The data collectors were trained for 2 days on the documentation of interventions and techniques of data collection.
- Supervisors were supervising data collectors on extraction of data from pharmaceutical care patient record.
- The principal investigator reviewed all filled DRP formats and questionnaires.

Data collectors**:** - Two pharmacists having basic knowledge on pharmaceutical care services were selected from the hospital and was trained by the principal investigator on the objectives of the study and how to record interventions in a daily basis. The training was conducted for two days.

Supervisors: - Two ward nurse heads were recruited to supervise the collection of data in the internal medicine ward and one pharmacist to supervise the collection of questionnaires.

5.10 Data Analysis

Qualitative data analysis was done after audiotapes were transcribed verbatim and notes were compiled. Thematic analysis was carried out. The transcripts and notes read repeatedly and emerging topics were identified as themes and sub-themes. Next, coding of interview text relating to these themes and sub-themes were performed. Quotes that would help in understanding of the content of the theme or subtheme were identified. Quotes are designated as pharm for pharmacy staffs and students, pharmK for pharmacists belonging to the key informant position and Doc for doctors assigned.

For quantitative part, data were checked for its completeness every day. It was edited, cleaned and analyzed, the collected data were entered into a computer using SPSS version-16. The data were summarized and described using cross tabulation. Descriptive statistics was used to characterize interventions, drug therapy problems and physicians expectations of pharmacists' roles. The results for each item on the questionnaire were reported as percentage and 95% confidence intervals. Statistical significance was accepted at P value of < 0.05.

5.11 Ethical Consideration

Letter of ethical clearance was obtained from Ethical Review Board of Jimma University. Letter that introduced the researcher, explained the purpose of the research very generally, confidentiality, anonymity and a help in the selection of interviewees was obtained from department of pharmacy for in depth interview. Informed consent was obtained from each interviewee and physicians. The quotes were identified by a code. Letter for cooperation from each level was obtained. Privacy and confidentiality was ensured during pharmaceutical care service. Thus, name and address of the patient was not recorded in the DRP format. From the pharmaceutical care service, DRPs were identified and resolved/prevented so that health and economic outcome was ensured.

5.12 Operational Definitions

Acceptance of pharmaceutical care interventions: is the doctor approves the proposal made by the pharmacist for the prevention or resolution of the DRP, either without making any modification to the recommendation or with a minor modification

Clinical importance of interventions: is a conclusion that an intervention has an effect of practical meaning to patients and health care providers and classified as follows:

- Extreme - life saving; deleterious: may lead to adverse outcome
- Major - intervention may prevent serious morbidity, including readmission, serious organ dysfunction, serious ADE
- Moderate - no benefit or minor benefit, depending on professional interpretation
- Mild - recommendation that brings care to a more acceptable and appropriate level of practice or that may prevent an ADE of moderate importance

CHAPTER SIX

Results

Physicians' Expectations of Clinical Pharmacists' Roles

Of the total 169 physicians, 147 responded giving a response rate of 87%. The majority of physicians 132(89.8%) were in the age range of 20-30 years. Of all the 147 respondents, 127 (86.4%) were males. With regard to physician's year of practice, majority of the respondents 145(98.6%) had 1-10 years of experience. A total of 99(67.3%) respondents were medical interns (Table 1).

Table 1. Personal information of physicians, JUSH, Ethiopia, March-April 2011.

Variables	Frequency (%)
Age	
20-30	132(89.8)
31-40	14(9.5)
41-50	1(0.7)
Sex	
Male	127(86.4)
Female	20(13.6)
Year of Practice	
1-10†	145(98.6)
11-20	2(1.4)
Current position	
Specialist	6(4.1)
Resident	34(23.1)
General practitioner	8(5.4)
Intern	99(67.3)

†Interns at the time of data collection had practiced more than 6 months

For all items measuring physicians' expectation, the mean response is between 1 and 2. The majority of physicians 129(87.8%) expected clinical pharmacists to be knowledgeable drug therapy experts with a mean ± SD (1.17±0.49) and 125(85%) to educate patients about the safe and appropriate use of medications with a mean ± SD (1.18±0.47). The descriptive statistics for physicians' expectations of clinical pharmacists' roles and duties are presented in Table 2. There

were no associations between physician variables such as age, sex, year of practice, current position and their expectation of clinical pharmacists' roles.

Table 2. Physicians' expectations of clinical pharmacists' roles, JUSH, Ethiopia, March- April 2011.

Physicians' expectations	Response			
	Agree n (%)	Neutral n (%)	Disagree n (%)	Mean± SD†
I expect clinical pharmacists to take personal responsibility for resolving any drug-related problems they discover involving patients	111(75.5)	21(14.3)	15(10.2)	1.35±0.66
I expect clinical pharmacists to be knowledgeable drug therapy experts	**129(87.8)**	**11(7.5)**	**7(4.8)**	**1.17±0.49**
I expect clinical pharmacists to assist me in designing drug therapy treatment plans for my patients	99(67.3)	29(19.7)	19(12.9)	1.46±0.71
I expect clinical pharmacists to advise me about more cost effective alternatives to the drugs I prescribe	106(72.1)	31(21.1)	10(6.8)	1.35±0.60
I expect clinical pharmacists to educate my patients about the safe and appropriate use of their medication	**125(85)**	**17(11.6)**	**5(3.4)**	**1.180±0.47**
I expect clinical pharmacists to maintain a complete medication profile on my patients	85(57.8)	54(36.7)	8(5.4)	1.48±0.60
I expect clinical pharmacists to monitor my patients' response to drug therapy and let me know if a patient encounters any drug-related problem	101(68.7)	32(21.8)	14(9.5)	1.41±0.66
I expect clinical pharmacists to know the specific indication of each drug I prescribe, even when drugs have more than one approved or recognized indication	89(60.5)	44(29.9)	14(9.5)	1.49±0.67
I expect clinical pharmacists to be available to me for consultation when I see patients (e.g. during rounds)	89(60.5)	38(25.9)	20(13.6)	1.53±0.72
I expect clinical pharmacists to assist my patients in selecting appropriate non-prescription medications	**71(48.3)**	**47(32)**	**29(19.7)**	**1.71±0.78**

†Responses were made on a 3-point Likert scale where 1= Agree, 2= Neutral, 3=Disagree.

Clinical Pharmacy Intern's Interventions

Overall, clinical pharmacy interns were present in the internal medicine for 16 days during the study period. A total of 149 drug related interventions for 48 patients were documented. Among them, 133(89.3%) were clinical pharmacy interns initiated interventions and 16(10.7%) were another health care professional initiated interventions (i.e. interventions were already handled by another health care professionals). Mean average age of the patients was 38±17.6 (range 18-80), majority of patients 32(66.7%) were females and mean average drug therapy problems identified per patient was 3.83±2.43.

Medication of all patients was evaluated for potential DRPs. DRPs identified were documented. These are summarized in Table 3. Unnecessary dug therapy was the most common drug related problem identified accounting a quarter of all documented drug related interventions. Of the 36 drug related problems classified as unnecessary, 18 (50%) were because there is no valid medical indication at that time, 9 (25%) were due to alcohol use or smoking and 7(19.4%) were due to duplication therapy. "Needs additional drug therapy" was also a common problem identified 34(22.8%). These were 17(50%) a medical condition requiring initiation of drug therapy, 12(35.3 %) were preventive drug therapy to prevent development of a new condition. The third most frequently identified drug related problem was noncompliance, 29(19.5%) including unavailability of drug product 18(62.1%) and the patient prefers not to take the medications 9(31 %).

Analysis of drug classes involved in interventions of all types showed iron, calcium, vitamins and other supplements, 30(20.1%) were found to be the most predominant followed by antibiotics, 22(14.8%) (Table 4).

Table 3. Characteristics of interventions documented by clinical pharmacy interns, JUSH, Ethiopia, March-April 2011.

Drug related problem category†	Interventions, n (% of total)
Unnecessary drug therapy	36(24.2%)
Additional drug therapy	34(22.8%)
Ineffective drug	4(2.7%)
Dosage too low	18(12.1%)
Adverse drug reaction	16(10.7%)
Dosage too high	12(8%)
Noncompliance	29(19.5%)
Total	149(100%)

†A classification scheme by Cipolle et al, 2004 (6)

And when we looked the frequencies of classes of drugs with each particular drug therapy problem; the most predominant were antibiotics from the 'unnecessary drug therapy' and 'adverse drug reaction' category, digoxine from the 'ineffective drug therapy' category, iron, Ca, vitamins and other supplements from the 'needs additional drug therapy' and 'dosage too low' category and anticoagulants, antihyperlipidimics from 'dosage too high' and 'noncompliance' category.

Table 4. Classes of drugs involved in interventions of all types, JUSH, Ethiopia, March- April 2011.

Drug class	Frequency (%)
Iron, calcium, vitamins and other supplements†	30 (20.1%)
Antibiotics	22 (14.8%)
Anticoagulants, antihyperlipidimics	17(11.4%)
Diuretics	16(10.7%)
Antacids, antiulcers	11(7.4%)
Analgesics	10 (6.7%)
Antiretrovirals	7 (4.7%)
ACEIs	6(4.0%)
Digoxine	6(4.0%)
Antifungals	5(3.4%)
Antituberculars	4(2.7%)
BBs	3(2.0%)
Bronchodilators	2(1.3%)
others‡	9(6.7%)
Total	149(100.0%)

ACEIs= angiotensin converting enzyme inhibitors; BBs=beta-blockers

†other supplements include potassium, multivitamins

‡antihelminthics, antiviral, sedative hypnotics

Clinical pharmacy interns in their stay in internal medicine ward during the study period were providers of pharmaceutical care resulting in 133 initiated interventions. Among those interventions they acted up on, dosage/instruction for use changed and consulting the health care professionals each accounting for 23 (17.3%) were the most interventions made followed by new drug started 19(14.3%) and drug stopped 16(12%) (Table 5).

Table 5. Types of interventions made by clinical pharmacy interns, JUSH, Ethiopia, March-April 2011.

Interventions Type	Frequency (%)
Non accepted interventions†	39(29.3%)
Drug stopped	16(12%)
New drug started	19(14.3%)
Dosage/instruction for use changed ‡	23(17.3%)
Switch to other drug(s)	3(2.3%)
Consult the health care professional§	23(17.3%)
Patient/medication counseling¶	10(7.5%)
Total	133(100%)

†interventions from a clinical pharmacy intern to concerned health care professionals but not acted upon it

‡DRPs classified as dosage too high or dosage too low and acted up on were classified in this group

§Consultations to health care professionals about potential and actual DRPs like laboratory monitoring, availing drugs,

¶Advice intended to resolve the DRP

A total of 68.4% of the interventions were fully accepted and 2.3% were partially accepted by physicians. All of the health education interventions that were made were accepted by the patients and implemented by the multidisciplinary team (Figure 1).

An independent clinical panel assessed the clinical significance of 94 interventions made by clinical pharmacy interns. The panel reviewed only those interventions which were considered fully and partially accepted. The panel and the intervening pharmacist were deemed to be in agreement if both assessed the same change (increase/decrease) and the same magnitude of change.

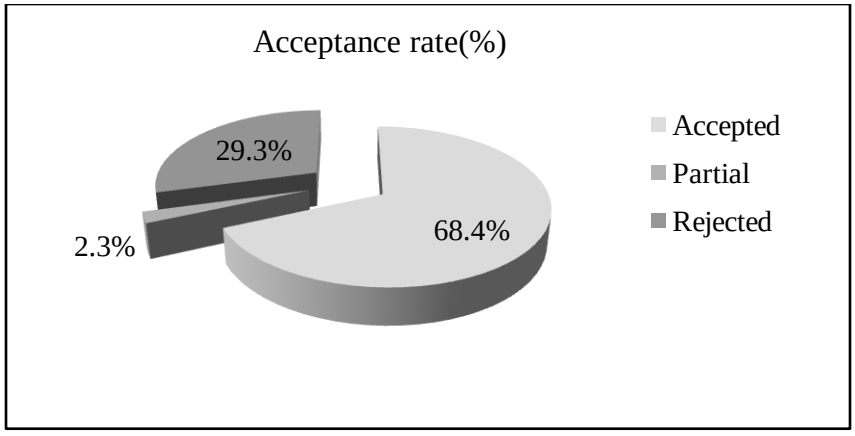


Figure 1. Acceptance rate of interventions made by clinical pharmacy interns, JUSH, Ethiopia, March – April 2011.

Individual ratings were different for some of the interventions and level of agreement was determined between the independent panels and the intervening pharmacists after discussion and consensus was reached. Half of the interventions were rated as clinically significant and a quarter of the interventions were of moderate importance (Figure 2). Illustrative Examples are presented in Table 6.

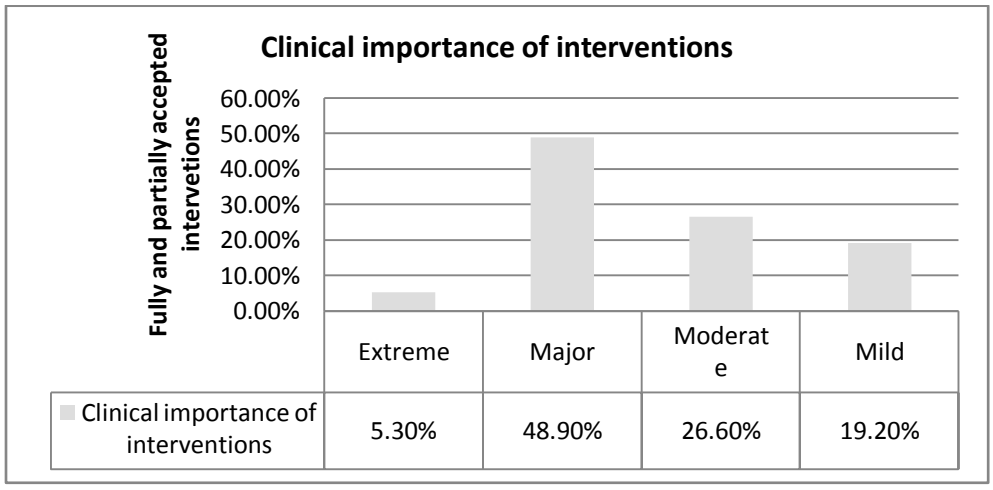


Figure 2. Clinical importance of interventions made by clinical pharmacy interns, JUSH, Ethiopia, March-April 2011.

Table 6. Examples of interventions initiated by clinical pharmacy interns

Interventions of moderate clinical importance

Drug related problem: lactating mother taking doxycycline for her pneumonia

Intervention: doxycycline is contraindicated in breast feeding mothers. So, a safer drug product is required due to risk factors. doxycycline was discontinued and substituted with safer drugs

Drug related problem: a patient taking salbutamol 5 mg po TID and salbutamol puff QID for his moderate persistent asthma

Intervention: Salbutamol puff was made PRN basis

Drug related problem: two analgesics (paracetamol and diclofenac) prescribed by an intern for mild intermittent fever

Intervention: duplication of treatment, little benefit but increased risks of adverse effects. diclofenac was discontinued.

Drug related problem: two antimalarials (coartem and chloroquine) for mixed malarial infection (p.vivx and p.falciparum)

Intervention: duplication of therapy, little benefit. Coartem can cover both infections. chloroquine was discontinued

Drug related problem: Fluconazole cimetedine drug interaction

Intervention: fluconazole was administered before 2 hrs of cimetidine administration

Interventions of Major clinical importance

Drug related problem: nephrotoxicity 2˚to gentamycin was noticed

Intervention: gentamycine dose was changed from TID basis to daily basis

Drug related problem: iron gluconate 300 mg po TID in the same dose as that of iron sulphate was prescribed for most patients to treat anemia

Intervention: the stated dose is too low to produce a desire effect. so, iron gluconate 600 mg po TID was initiated for all cases

Drug related problem: a patient with CHF 2˚to ischemic cardiomyopathy and hypertriglycermia

Intervention: fibrates were recommended but due to unavailability replaced with lovastatin

Drug related problem: warfarine induced hemorrhage that results in hypovolemic shock

Intervention: start Vit. K 5 mg IM stat

Drug related Problem: a 41 kg female patient on antiTB (RHZE) taking 2 tabs po/day

Intervention: dose of antiTB was increased to 3 tabs po/day

Implementation of Clinical Pharmacy Service: the Challenges, Opportunities and key informants' views

The research presented here represents an in depth interview of the challenges and opportunities and key informants' views of the implementation process of clinical pharmacy practice in JUSH. We identified three main themes from the interview with pharmacy staffs and students: opinion on the current trend shift, critical factors to implement clinical pharmacy services. 'Pharmacy: current to future perspective' was drawn as a main theme for both key informants and pharmacy staffs and students. And this theme is presented along with the interview analysis of the key informants. The other main theme presented for key informants is entitled as 'patient oriented pharmacy services: what it look like?' Interviews were conducted until saturation was reached. A total of seven interviewees were nominated from hospital pharmacy, academics and students (both postgraduate and undergraduate). This group was interviewed to describe the challenges and opportunities in the implementation process of clinical pharmacy service. In addition, they were interviewed to describe the future competence of the pharmacy profession. And a total of thirteen key informants were purposefully chosen from the hospital including nurses, pharmacists and physicians. These were interviewed to assess their perceptions of the existing pharmaceutical service and clinical pharmacy service and its implementation. Overall, nineteen interviewees were involved in this qualitative study. But for simplicity, we presented separately.

Challenges and Opportunities: pharmacy staff and students opinion

Opinion on the current trend shift

All of the pharmacists interviewed indicate as they were happy with the current trend shift in the pharmacy practice. Pharmacists were formerly confined to the counter and the shift is the time to have a great place in medication therapy management in our country. The old pharmacy program was completely different. Before it was product oriented but now directly contacted with a patient so that therapeutic drug monitoring, medicines consultation to staff is a new role pharmacists are assumed. Although newly introduced, involvement of a clinical pharmacist in wards as nurses and physicians did can benefit a patient. Pharmacists are assuming more roles than before. The respondents argued that the pharmacy personnel should come towards consuming the profession in the right track.

"If additional roles are in to play, societal dignity will increase. There will be preparing for new roles other than dispensing. As you approach more towards a patient, you will develop a confidence. [For the patient] it is a team work. [Pharmacists] have a unique role…"(pharm 06)

"I think the profession will achieve its level of competence, after then. Drug related problems will be reduced to a great extent. There is no way to reback prescriptions for correction. In my experience in team training program, we were in team together involved in prescription processing before dispensing…" (pharm 05)

"…it is a great thing to go in parallel with the world. Ethiopia is part of the world. Even this program is started even in other countries. It is not for the sake of other countries but there are lots of reasons: quality drug treatment is the point…"(pharm 03)

Critical factors to implement clinical pharmacy services

Pharmacy staffs and students who were interviewed were asked to comment on factors believed to influence the implementation of clinical pharmacy services in JUSH. From the interview it became clear that a lot of changes are required in a number of aspects of clinical pharmacy service in JU if clinical pharmacists are to provide high quality pharmaceutical care. A number of important factors which influence pharmaceutical care provision both positively and negatively should be taken in to consideration.

Perceived challenges

Human power: most of the respondents indicated that trained human power is a very important factor for the implementation of clinical pharmacy service. Shortage of skilled pharmacists was the great challenge. Though, it was claimed that physicians are part of the staff to implement clinical pharmacy program. Physicians in any clinical service specialization were considered as preceptors.

"As a challenge, shortage of staff as it is the first of its kind. There is no qualified pharmacist on clinical pharmacy specialty. The program is undergone by physicians and pharmacologists. The program, probably, might be far from in the way we thought. But as a beginning it is good. Lack of preceptor at wards in practice is another challenge…" (pharm 07)

"New to the program including physicians is the great challenge. They might read what it is. But the question is how to implement practically. Whenever we attach wards we are flooded with questions like 'who are you? what u doing?' ……"(pharm 03)

Some respondents argued that in working with pharmaceutical care in wards, assigned pharmacists might be too few in number and had a high burden to deliver clinical service. Current trend shows as there are lots of prescribers but four or five dispensaries. So, the respondents ascertained that we had to have lots of pharmacists assigned from the point of access of every bed.

Awareness creation: pharmacists cited that being familiar with the program and involved in the service was a great impediment. Most of the respondents said that every staff should be aware of the role clinical pharmacists had in the health care system. One pharmacist quoted:

"Most of the time most people think that clinical pharmacy in developing countries is like a luxury. But I don't believe that. One of the impacts of clinical pharmcy is reduction of unnecessary drug costs. If so, it is not a luxury. rather, it is more important for poor countries…"(pharm 03)

Results from the interviews conducted indicated that a number of pharmacists reported that physicians may perceive that pharmacists are going beyond what they were. When performing a more clinical role, pharmacists believed not only that physicians perceived them as crossing their territory, but also that they themselves were crossing the dividing line between professions.

"The challenge is these 'African kings'. They assume as if their role is taken. But their role is as it is. They are assisted rather. Not interfered with their jobs. They stand for dignity than patient benefit. How can assume new roles without accepting the increment in number of physicians at undergraduate levels? (…) The pharmacist himself is a great challenge. He crosses the boundary that was not present: out of a single room towards a vast area (…) Pharmacists' preparedness is a key to do so. It is not crossing the boundary rather stand for a patient. The patient believes physicians are responsible for their treatment outcome. What if we approach them, talk something about his/her medication…." (pharm 06)

Most implicated that JU is known for training of physicians than pharmacists. They ascertained awareness creation should precede than service. As far as a new program was launched the hospital staff should be acquainted to new roles of a pharmacist, they added.

"The most problematic thing is attitude itself. The time is a great factor to involve us (…) Breaking the trend is so difficult. When in team, there is lack of transparency. They considered as if they will be frustrated with different questions. They left their gaps aside…." (pharm 05)

Organization scheme and administration support: The analysis of qualitative data indicated that the lack of administration support was considered a major obstacle facing the pharmacists to

extend their activities to be pharmaceutical care providers. Many of them noted that the top managers in the hospital administration do not pay any attention to improve the pharmacy department in the hospital. They also added as this is not the case of their managers only but the government too. Regarding government concern of the program one clinical pharmacy intern noted:

"Really the government should be convinced of the program's impact in the health care. The professionals through professional associations should show the impact it has so that the government will accept it (...) it is not enough to put Americas' experience. We should show Ethiopian situation. You can produce as much pharmacists as possible. But the thing is they have to have the legitimate to practice it…" (pharm 03)

The implication of the finding from the interviews of the study is that the pharmacy department management does not support the activities of those pharmacists committed to pharmaceutical care. And few argued that the structural and organizational scheme was the difficult to appropriately deliver a clinical pharmacy service.

"….we start from zero. There is no organizational frame work which incorporates us. There is no tool for documentations of services. To deliver pharmaceutical care service, tool is necessary. We are lack of a standardized tool. For future, it should be released as policy at the country level…" (pharm 03)

Several respondents responded that amendment of the hospital's policies and rules should be done.

"… Pharmacy was confined to academics only. There is no place/structure left for pharmacists in wards. We should start to give a service in wards as nurses and physicians do. In the name of ward pharmacist the structure should be designed. It is not difficult to lay down…." (pharm03)

In the contrary, there were respondents indicating that the organization structure has not much influence in the pharmaceutical care service delivery. "……*rather it is an opportunity that facilitates the interaction among health care providers…" (Pharm* 01*).* The pharmacy department was part of the hospital and clinics administrative structure. But they mentioned, as a service it is not full and even the service was taken by postgraduate clinical pharmacy students.

Perceived opportunities

The university's philosophy: Most claimed the university's policies and procedures create their own conducive environment for working with pharmaceutical care. One pharmacist quoted the following:

"The ideal site to practice pharmaceutical care is team training program (TTP). I can say JU can do it more than others do. It is the university's philosophy which makes it pioneer. After this time onwards, as the curriculum is already shifted, they [pharmacists] have the knowledge to practice in team elsewhere. It is easier for interaction between students than between staffs. There is no question to dignity here (….) community based education is vital…." (pharm06)

Majority of the respondents noticed that JU had positive attitude towards the program though some established problems were described as barriers for the implementation of clinical pharmacy. In line with this, to achieve the pharmacy department's mission, established policies and procedures should be modified with major framework untouched.

"…to facilitate the implementation of the program (….) we need bodies that strictly follow the completeness of the program. Above all, JU is famous for incorporation and launching of new programs. But supervision from the ground should be created…." (pharm 07)

Few pharmacists noticed the notion that 'Ethiopian Hospital Reform Implementation' is underway. And they hoped that they are waiting for that.

"…the government is in reform. Eg, BPR, service expansion. All these are part of the health service reform (…) pharmacists involvement in the health service is on the expansion. This is not an issue of the pharmacy professionals' or university's only. The issue of the government too…." (pharm 07)

"….as I see the BPR documents, it allows pharmacists should attach wards. Up to 15 pharmacy personnel (10 pharmacists + 5 pharmacy technicians) should be recruited for a hospital. If so, it will facilitate the process…" (pharm 04)

Practice level benefits: Pharmacists had an effect at practice level. Practice level benefits range from communicating with other health care providers to directly contact a patient for drug related problems.

"There is nothing beyond observing things in the eye of you. So, close to patient and observe for treatment outcome, risk, risk benefit analysis and give recommendations accordingly….."(pharm 07)

"…I can talk and work with other health care providers equally. Before, we are considered us in the health care system but no communication channel with others. Being present in wards and communicate with other health care providers makes me satisfied…" (pharm 04)

Majority of the respondents claimed that clinical pharmacy is vital. They believed assuming an additional role by itself was the most stimulating in working with the pharmaceutical care. But sometimes resistance to physicians was part of the challenge as initially described. One pharmacist noted:

"…we should convince of the role we have. We should influence them (…) residents as they are students are receptive to new roles, interns too. They need the assistance of pharmacists…" (pharm 06)

Few of the interviewed mentioned as they were in a specialized hospital, a range of disease cases created a suitable environment for practicing and giving service. Majority indicated that a well staffed medical school with various specializations and affiliations with international universities were among the important factors in the implementation of clinical pharmacy.

Implementation of clinical pharmacy service: Viewpoints of key informants in JUSH

Pharmacy: Current to future perspectives

All of the respondents interviewed express diverse and conflicting perspectives on pharmacists' role, varying from a health care professional to a business man. The pharmaceutical services delivered in Jimma University Specialized Hospital are not out of the three domains: procurement and distribution, dispensing and patient medication counseling (Table 7). They mentioned as pharmacists are confined to the counter with little patient oriented service. There was a fear, even, that service is not done appropriately and claimed to be substituted with recent advancements to technology.

"The role of the pharmacy in the current situation might be substituted with robotics. Not only dispensing, robots are doing minor surgery even. Currently what is doing is simple dispensing. Because it is difficult to say even we are delivering medication information. You can see OPD pharmacy how narrow the windows are? Not more than words of greeting the dispenser talk to patient….."(pharmK04)

"…it was a kind of giving a chemical with little information. But thinking of what should be the future…" (pharmK03)

Majority of the interviewed said that pharmacy in the health care system has a unique role and should be involved in the clinical aspect for the best interest of patient care.

"…for sure, one profession can't be full alone. All HCPs should work together for complete health service. Amongst, the pharmacy profession shares distribution and proper utilization of drugs (...) any drug related and pharmaceutical care service is the responsibility of the profession…" (pharmK02)

"…without pharmacy how can be the health service is full. 'On one leg u cannot climb two trees'. Every profession has its own unique role….field of specialization is a must…" (pharmK03)

Several respondents indicated the profession should be out of business. Rather it should be realized as an applied science like any other health science disciplines. This was the most likely factor that hinders the professional competence in the medical arena. They argued against pharmacy as a health care professional that is reimbursed primarily through sale of a product rather than for provision of patient-specific service.

"….most of the time when you learn pharmacy, everybody's focus is opening pharmacy shop to do a business. This is the main thing that results in narrowing of the scope of pharmacy profession…. in this case, is it surprising to say pharmacists are doing what ordinary people do…" (Nur 03)

"…Many of them [pharmacists] are business oriented. Rather than to make the profession ahead of time, they want to make themselves ahead of time. Who cares the profession? I don't know. Nobody is eager to change the profession to its standard. If you are watch keeping, who can make the profession competent enough to cope up with the current advancements in technology…." (pharmK 05)

"…it is we ourselves that killed the profession. The profession is on the hand of us…" (Pharm 05)

Respondents who were interviewed were asked to comment on the future competence of pharmacy profession. From the interview data, it became clear that important changes are required in a number of aspects of pharmacy education in Ethiopia if pharmacists are to provide high quality patient oriented pharmacy service. Majority of the interviewed argued that curriculum shift is the base to see pharmacy education as advanced as the Westerns. They indicated that trainings and capacity building are parts of the change. Pharmacy education has engaged in widespread curricular change to better prepare graduates to assume increased responsibility for patient care.

"…Knowledge precedes practicum (…) for eg, if I want to work in DIC I should be equipped with the knowledge. Need by itself is not a guarantee for change. The curriculum should be clinical oriented…." (pharmK01)

Again, others argued that revising the goals, content, and processes of pharmacy education will not in and of itself change practice. Although pharmacy educators had a responsibility to prepare their graduates for evolving professional roles, academia alone cannot create these roles in sufficient number to impact broadly on the practice of pharmacy. Academia can help to innovate, but any sustainable change in pharmacy practice ultimately must be driven and maintained by the practice. But the challenge described was lack of a skilled human power on this area.

"….the curriculum should shift towards patient oriented (...) currently, national/international demand is more of service. So, the curriculum should be designed in that way. Skill part is necessary. But the question is to get experienced leaders on it. I hope the future pharmacy is bright of changes. If you see, the hospital reform implementation guideline by Ministry of Health; one of the major duties of a pharmacist is to deliver pharmaceutical care service. In accordance with this, the new designed curriculum has a more to do it…" (pharmK 02)

Some stated that academic staffs must work more closely with the profession, particularly in the areas of experiential education, development of new patient-centered practice models, and student professionalization

"… in the context of BPR, the department should take the service so that involved in the service (…) the current situation is not good enough. The academic staffs are not involved in the service. Only one or two are involved in the coordination activity. But managerial activity is not the problem of the hospital. What we expect is to provide quality service to different departments (…) and run the service like other clinical departments do…." (Doc 2)

Six of the nineteen interviewed said that pharmacists were not doing what is expected of them even with what they had. In the absence of a stimulating practice environment, new graduates eventually fill discomfort by the mismatch between what they are "taught" and what they actually "do"; and more mature members of the profession grow increasingly convinced that the academy has lost touch with the real world. One pharmacist quoted the following:

"…'pharmacists are the well trained but the less employed professions'. We should busy of ourselves in the service so that the future will be bright…"(pharm 03)

"…pharmacy in school and in real work is indifferent. We know a lot but assuming the lesser…" (pharm 06)

The interview data indicated pharmacy will transform itself from a primarily product-centered profession to a patient care-oriented profession. The profession's movement toward patient-centered practice results in the implementation process of clinical pharmacy practice. Most believed the time is at hand to unify the profession in pursuit of its patient care mission. Pharmacist continues to become more involved in providing patient-oriented services: the demand for practitioners in this area of pharmacy continues to grow. Health care will place increasing emphasis on drug therapy to improve patient outcomes and quality of life. Prescription drug use will continue to rise; creating greater risk of drug-related morbidity. A physician quoted the following:

"…formerly, it was infectious disease is a concern but this time as we are shifted towards middle income countries we are going to have a lot of chronic patients(…) We are going to have a lot of patients taking drugs for life long, we will have lots with co morbidities. In any occasions, demand and sophistication is on the increase. If we produce pharmacy graduates as before we will remain as it is. In such situation everything rests upon physicians. We are leaving everything for physicians. So what we need is multidisciplinary team……" (Doc2)

The general consensus of the interviewees was there is much to do in the area of pharmacy. From the history itself, pharmacy has struggled to achieve the profession's mission: implementation of pharmaceutical care.

"…clinical pharmacy was introduced 20/30 yrs back. We are 20/30 yrs back. Pharmacy is having a long way to develop. With respect to others, we are so far. As I said we were in the other way round. Nobody notices what was going on. We know why pharmacists number is increasing (…) we are making functionless; we are making idle. We are not using their knowledge…." (Doc 2)

"Let's stop to say it doesn't concern me. Each and every issue should be issue of us…" (pharm05)

Patient oriented pharmacy services: what it look like?

The pharmacists interviewed indicated as they are eager to move towards the patient care more than being product-oriented. All of the key informants implied the two are totally different in various aspects. It is like a patient comes with a prescription and a pharmacist towards a patient. Some of them believed it is this type of product oriented pharmacy service that lessens the role of the profession in the health care service commenting as:-

"….to say a health care professional, they [pharmacists] should come close to patients. Otherwise, not…" (Doc 2)

"…you don't understand without observe the patient. Let's see the patient, let's share patient's pain, let's observe patients, let's observe drug complication. Anybody can read books (…) it is not learning theory what will happen rather observe simply what was created. After this, you can teach your student (…) so the academicians should come to hospital…" (Doc 1)

Besides this, clinical pharmacy postgraduate program was launched in JUSH in 2009. Clinical pharmacists are now practicing alongside physicians, nurses and other healthcare professionals. All of the respondents believed pharmacist as patient care provider should be involved in the multidisciplinary team. And appreciated the way they are going towards pharmaceutical care through clinical pharmacy. Physicians quoted the following:

"Ideally, the term clinical pharmacy is more palatable than pharmacy. Pharmacists have a responsibility of provision of drugs, delivering drug information where as clinical pharmacist is like somebody treating a physician (…) it is not like somebody prescribes and the other provide the drug. Here the prescription needs to be considered by the clinical pharmacist. They have influence on prescription writing too…." (Doc 1)

"…clinical pharmacy is all about quality. This is a greet input to deliver quality level service to patients, physicians, pharmacists and the hospital, too…" (Doc 2)

All interviewed described that to achieve the mission the profession has, collaboration among the health care community is necessary. They added a well functioning cooperation among the health care professionals and the pharmacy staff should be established. In fact, the profession must become united by establishing common goals that meet public need. The health care community, in turn, must know that this philosophy of practice puts the patient as the primary beneficiary of the profession. Professionals must work together patiently, honestly, and meaningfully to revise pharmacy's practice to support a level of patient care that genuinely affects patients' drug therapy outcomes.

"…the middle is the patient. Others are all around: the physician, the nurse and the pharmacist. Patient care should be in a sense of team approach. They should contact with a patient. At the same time, they all talk to each other…" (pharmK02)

"Collaboration among the physician, the nurse and the pharmacist should be seen from the perspective of patient care…" (Nur 01)

Majority of the respondents described the benefit clinical pharmacy has in the health care ranges from inpatient counseling to drug therapy changes. They put the final goal is societal benefit. As a society benefited at the same moment the profession will be benefited.

"…the profession is recognized by the society. In my life, I hadn't heard no child wishes to be a pharmacist. I wish to be a doctor/ engineer like that…" (pharmK03)

Provision of a cognitive service begins with the recognition of a possible patient drug therapy problem and is followed by intervention to verify that the problem is clinically relevant and to determine an appropriate solution. The results from this study show that the intervention may include changes in drug therapy up to patient counseling.

Table 7. Pharmaceutical services delivered in Jimma University Specialized Hospital

- Economical and efficient procurement and supply of drugs to various departments (inpatient pharmacy, ART pharmacy, pediatrics pharmacy, ophthalmology pharmacy, outpatient pharmacy)
- Outpatient and inpatient medication dispensing
- Patient medication counseling especially for chronic patients
- Drug information services
- Safe and secure storage and efficient distribution of drugs
- Facilitating the safe, effective, and economic use of drugs, through prescription error monitoring
- Monitoring the quality of drugs including monitoring for expiry dates and proper disposal
- Controlling the drugs' budget

CHAPTER SEVEN

Discussion

The current trend shift in the undergraduate pharmacy curricula necessities the practice of patient oriented pharmaceutical care. This area of practice is at the infant stage in Ethiopia. The Ethiopian health authorities have sought to implement pharmaceutical care services within the nation's health care system in order to improve patients' quality of life and drug use. Successful implementation of pharmaceutical care requires cooperation between physicians and pharmacists. Though direct patient care is still exclusively in the hands of physicians in Ethiopia, pharmacists' input in managing drug therapy ultimately depends on physicians' willingness to accept this role. It is therefore important, what physicians expect of pharmacists roles would be a prerequisite to aid the effective introduction of pharmaceutical care and implementation of ward based clinical pharmacy service.

Physicians in this study were asked about their expectation of clinical pharmacists roles. These roles included simple established roles to more extended ones. All the mean response values were between 1 and 2, suggesting that physicians have strong expectations that clinical pharmacists will provide any of the services and duties described (Table 2). This is in line with studies reported in other countries: Sudan, Pakistan, Kuwait (26, 33, 34). Though it was a decade years ago, physicians in California were not sure of what they expect of pharmacists (32). Physicians' expectations of clinical pharmacists were positive for most domains, were more likely to 'agree'. Physicians in this study appeared to have high expectations of pharmacists as knowledgeable drug therapy experts and expect them to educate patients about the safe and appropriate use of medications. This is consistent with the results of the study reported in Sudan and Kuwait (26, 34). In the contrary, Pakistan study reported as physicians expect of pharmacists to monitor their patients response to drug therapy more than expectation as educators about the safe and appropriate use of medications (33). A study in Malaysia reported general medical practitioners agreed that pharmacists are the best health care professionals to educate patients about the safe and appropriate use of medications (35). But their expectation was low. It might be due to study setting and participant difference. There was less agreement for the statement ''I expect pharmacists to assist my patients in selecting appropriate non-prescription medications''

where respondents were neither strongly agreed nor disagreed. Again, this seems to highlight a less positive attitude about pharmacists interacting directly with patients concerning appropriate choice of medicines and accords with the higher prevalence of discomfort found in these domains. This finding is in line with observations elsewhere (26, 34).

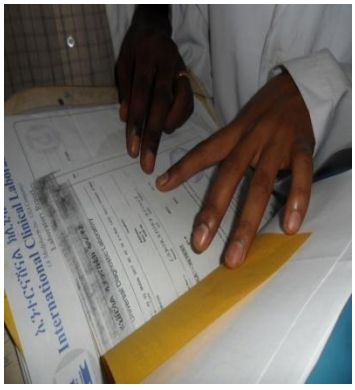
The interviewees responded that there is a need for Ethiopian pharmacists to work more closely with physicians, thereby providing the physician with an opportunity to observe pharmacists performing clinical responsibility leading to an input to the physicians' awareness and building confidence for the pharmacists. This pilot assessment of pharmaceutical care interventions by clinical pharmacists was, thus believed to enhance the implementation of clinical pharmacy in JUSH in particular and in Ethiopia in general. The results are discussed explicitly as follows.

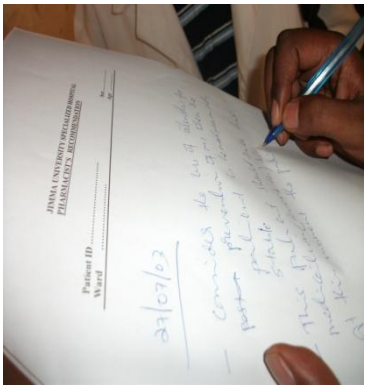
Clinical pharmacists' intervention did not give answers to the essential patient outcomes: to prevent, cure, arrest or slow diseases or symptoms. But the clinical pharmacist contributes to the general patient outcomes by improvement of the drug therapy. In other terms, this study provided evidence for the benefit of a patient to a more correct drug use by clinical pharmacist initiated interventions. A number of studies reported involvement of a clinical pharmacist in patient care in the inpatient hospital setting results in safer and more effective medication use through the identification, resolution and prevention of drug therapy problems (16, 17, 23, 24, 25, 30). The interviewees also indicated clinical pharmacy service is quality service delivery. But to do so, a multidisciplinary team is essential. The qualitative data showed the relationship between the physicians, the nurse and the pharmacist should be seen from the perspective of patient care. Majorly, the cooperation between the clinical pharmacist and the physician was a key to resolve and/or prevent drug related problems. In recommending that clinical pharmacists utilize a document such as pharmaceutical care plan to promote contact with a patient and a physician, to assist with medication reconciliation and to identify drug related problems. Absence of a standard documentation and the lack of trained human power in this specialty were the challenges confronting clinical pharmacy service delivery as the interviewees reported.

Clinical Pharmacy Interns in Wards

A) Patient chart review

B) Medication history taking





C) Laboratory result assessment D) Pharmaceutical care plan documentation

E) Clinical pharmacy interns with a physician and a nurse

F) Patient medication counseling

To our knowledge, this is the first study to report results of the implementation process of clinical pharmacy service in the African hospital setting. We found that clinical pharmacists through the provision of pharmaceutical care were able to propose a lot of interventions to a wide variety of DRPs and drugs.

The most common drug related problem in our patients was unnecessary drug therapy (24%) with the most common reason being no valid medical indication (50%) and much of the share was to antibiotics. A study in Indonesia showed antibiotics are the third most agents involved in unnecessary drug therapy (36) but the cost incurred on them is the highest. They were initiated with suspicion of urinary tract infection, coronary pulmonary disease, cardiovascular disorders with normal white blood cell count (WBC), afebrile, normal urinalysis, and normal chest X- ray. Unnecessary drug use has two implications according to this result. On the one hand, antibiotic use without indication and over prescription has their own effect on the emergency of resistance to particular strain. On the other hand, in this era of inflation drug therapy costs are on the rise. This is cumbersome for developing nations. Prevention of unnecessary drug therapy will contribute in cost saving among hospitalized patients. Numerous US studies have demonstrated cost reductions when pharmaceutical care is provided (25, 30). In Australia the value of clinical pharmacists in reducing costs of treatment and shortened hospital stays has been reported (37). A study done in Sweden has showed the addition of pharmacists to health care teams would lead to major reductions in morbidity and health care costs (12). Though we were not dealt on costs to

treatment; interventions must have a financial impact that demonstrates evidence as scientifically robust and ethically justifiable (2) so that outcomes can be communicated to policy makers.

The second most common drug related problem that lead to intervention was needs additional drug therapy (22.8%). The majority of these (50%) were medical conditions requiring initiation of drug therapy and 35.2 % of them were indicated to prevent the onset of a new medical condition. A study in Minnesota has reported additional drug therapy is the most identified drug therapy problem accounting for 32% of DRPs (13). MacKinnon et al found untreated indications (43.5%) were the most common (9).

The drug classes most frequently involved in drug therapy problems and interventions were iron, Ca, and vitamins (20.1%). This is somewhat a higher value with intervention study by Rasmussen et al. which also found that vitamins and minerals were the most common drugs involved in the intervention (5.5%) (16). This might be due to the overall perception of prescribing iron gluconate in the same dose as iron sulphate and adult onset malnutrition were common. Antibiotics were the second most frequently implicated classes of drugs in the intervention. As mentioned above, problems with antibiotics were so vast that guidelines were not likely followed.

The majority of our interventions were accepted and were deemed clinically important (Figure 1 and 2). Moderate higher acceptance rate was found in this study. Spinewine et al described acceptance rate of as low as 67% can be consider as a higher value (24). Physicians' expectation in this study was good enough compared to observations elsewhere (32-35). It is not surprising to get this value. Physicians acted as preceptors in some of the sessions. The interviewees also indicated as physicians are receptive to pharmacists' roles. The challenge indicated was there is no structure left for pharmacists in wards and any means of reimbursement for the service was the issue raised too. Underreporting was also a common problem as described by Rasmussen et al (16). The impact of pharmacists' interventions documentation is well described (4, 15, 16, 38). Ward based clinical pharmacy service was indicated as time consuming to document interventions (16, 38). However, several studies show that the costs of increased time spent by the pharmacist are outweighed by the benefits (39). In addition, many of the respondents in this

study indicated professional satisfaction with the clinical pharmacy service was encouraging with both health care professionals and pharmacists supporting the implementation of pharmaceutical care. This is further supported by the clinical significance of interventions made. Studies reported the impact of this service method was demonstrated by the number and clinical importance of the interventions made (24, 38). It was the responsibility of an independent review panel to assess the impact of interventions. This method of evaluation of clinical pharmacists' interventions by a multidisciplinary panel is an approach utilized by other investigators (24, 37, 38). The higher value of major clinically important interventions strengthens our result (Figure 2). This might be due to the fact that as clinical pharmacists documentation was strictly adhered to time and they would likely to document interventions of major clinically importance. A prospective multicenter study by Dooley et al showed a quarter of interventions were major in clinically importance (37). Spinewine et al described the same result in elderly population (24).

It is recognized internationally that clinical pharmacy services provided by pharmacists are an integral part of the profession. The innovation of new practices in pharmacy is influencing the "professional transition of pharmacy" (40). This was the idea what was supported by our interviewees. The qualitative data ascertained the change in pharmacy practice and education towards implementation of clinical pharmacy services was seen as a must. Society will become increasingly technology literate and technology driven. Technology will be deployed fully to dispense most prescriptions, provide drug information to patients, and facilitate the exchange of patient-specific data among and within the health care systems. Because of the reason mentioned, the pharmacy profession is in reform from time to time and country to country. Patient-oriented pharmacy practice is the current agenda of JUSH after considerable progress was made in change of the curriculum as described previously. Recently, the pharmacy profession has begun to shift its emphasis from technical product-oriented issues to patient-oriented informational and cognitive services in Ethiopia. However, commitment to academic development and excellence does not necessarily dictate a need for professionalization (1). Academia can help to innovate, but any sustainable change in pharmacy practice ultimately must be driven and maintained by the practice. This was indicated as a major barrier in the implementing clinical pharmacy services. Academicians should come to patient level to acquaintance the practice to their students. Added on this, skilled personnel on this specialty was

was the other factor. However, physicians' expectation of clinical pharmacists' roles was higher and involvement of them as preceptors was an opportunity that facilitates the implementation. The university's philosophy was good to develop team spirit though administration support was indicated as a challenge in recruiting skilled personnel.

The public perception of pharmacist is very week. The general population considers pharmacists are drug traders and obviously not better than the general store owners. Consumers and patients consider a visit to the medical store to purchase drugs in much same way they consider a visit to a grocery to buy food items (41). This was what most of the interviewed in our study supported and suggested pharmacists should be out of business to widen the scope of the pharmacy profession. Whatsoever, the pharmacy profession has come a long way in a little more than a century. The current pace of change, however promises more momentous transitions over the next few decades. The continued specialization of pharmacists in specific disease states, the growing trend of pharmacy certification and the rapid diffusion of technology as a facilitator to the profession shift in the composition of its workforce and philosophy. It remains clear; however that pharmacy will remain an integral part of our health care delivery system and an existing career choice for its practitioners.

Limitations of the study

The under-reporting of interventions may have caused distortion of the data, especially if there was a tendency for some intervention types to be under-reported. In this study, the amount of time spent documenting incidents was probably the main barrier to the documentation process, since pharmacists did not receive that much attractive incentives (financial or human resources) to aid in the documentation. Pharmacists often document interventions related to DRPs when they are concerned about the importance of the assessment. Our documentation system also did not report the cause of the problem or the outcome of the intervention. The interventions made by another health care professional were not assessed for clinical importance and compared with pharmacists' intervention.

The absence of a control group in the study did not allow us to know how many changes in medication were made without the pharmacist's participation, and if the clinical pharmacist actually increased the number of changes in medication.

The other limitation is the study didn't address the pharmacoeconomics part of the intervention made. To be scientifically plausible and ethically justifiable this type of studies are crucial and even to bring them to policy makers.

CHAPTER EIGHT

Conclusion and Recommendation

8.1 Conclusion

It was found that the majority of physicians were receptive to pharmacists undertaking many of the activities suggested to them. However, physicians were less receptive to any kind of recommendations regarding prescribing medications to patients.

The provision of pharmaceutical care by clinical pharmacists can result in improved recognition of the full range of drug therapy problems confronting patients. A clinical pharmacist contributes to a more correct medication of inpatients, even with the modest contribution such as participation in the pre-round meeting and the ward round twice per week. The study may support the argument for full implementation of a clinical pharmacy service, as this is not the case in other parts of the country. Analyses such as those presented here provide information to better focus the training of practitioners based on the most frequently encountered drug therapy problems in the hospital setting. If pharmacists become familiar with these common drug therapy problems, they will become adept and competent in managing these conditions. But need for standard documentation and skilled human power in this specialty was the barriers. There was also a need for academicians to come to close to wards. The majorities of our interventions were accepted and were deemed clinically important. Thus, clinical pharmacists with postgraduate clinical knowledge and training are best suited to perform the tasks in the setting described.

The qualitative data showed clinical pharmacy service implementation is a must so as to go in parallel with the current pace of change in the professions mission and philosophy. The progression of the pharmacy profession towards implementing clinical pharmacy services involves a paradigm shift of attitudes, appropriate infrastructure and support. Although the challenges for the pharmacy as a profession is in its initial stages compared to the developed countries the results of this study revealed a high demand for this service among health care providers.

8.2 Recommendation

1. Implementation of clinical pharmacy service in a teaching hospital in collaboration with physicians can be established
2. A key to extend the role of a pharmacist should involve making pharmacists more accessible to patients and physicians
3. A standardized protocol for documentation of pharmacists' activities should be devised.
4. Reimbursement systems should be applied for the service pharmacists delivered for an extended roles
5. The hospital structure should have a place for pharmacists in wards like nurses and physicians
6. Skilled personnel from affiliated international universities in this specialty should be taken into consideration.
7. Academicians should be assigned to wards to precept their students
8. Clinical pharmacists should be hired to reduce drug misadventures

REFERENCES

1. International Pharmaceutical Federation: FIP global pharmacy workforce report 2009. Available: www.fip.org/hr (accessed December 13, 2010).
2. Matsoso MP. Future vision and challenges for hospital pharmacy. Am J Health-Syst Pharm. 2009; 66(3):9-12.
3. Lisa N. Current status of pharmacist influence on prescribing of medicines. Am J Health-Syst Pharm. 2009; 66(3):29-34.
4. Davydov L, Caliendo GC, Smith LG, Mehl B. Analysis of clinical intervention documentation by dispensing pharmacists in a teaching hospital. Hosp Pharm. 2003; 38:346–350.
5. World Health Organization, Geneva. Developing pharmacy practice: A focus on patient care; 2006.Document no. WHO/PSM/PAR/2006.5.
6. Cipolle RJ, Strand LM, Morley PC. Pharmaceutical care practice: the clinicians guide .New York: McGraw Hill; 2004.
7. Strand LM, Cipolle RJ, Morely PC, Perrier DG. Levels of pharmaceutical care: A needs based approach. Am j Hosp pharm.1991; 48:547-50.
8. Baena MI, Faus MJ, Fajardo et al. Medicine-related problems resulting in emergency department visits. Eur J Clin Pharmacol 2006; 62: 387–393.
9. MacKinnon NJ, Morais C, Rose T. Drug-related problems identified in a workplace asthma self-management program. Can Pharm J 2007:140(2):110-115.
10. Fijn R,Van den Bemt PM, Chow M et al. Hospital prescribing errors: epidemiological assessment of predictors. Br J Clin Pharmacol 2002; 53:326-331.

11. Manley HJ, Drayer DK, Muther RS. Medication-related problem type and appearance rate in ambulatory hemodialysis patients. BMC Nephrology 2003, 4:10.
12. Gillespie U, Alassaad A, Henrohn et al. A comprehensive pharmacist intervention to reduce morbidity in patients 80 years or older: A randomized controlled trial. Arch Intern Med. 2009; 169(9):894-900.
13. Rao D, Gilbert A, Strand LM, Cipolle RJ. Drug therapy problems found in ambulatory patient populations in Minnesota and South Australia. Pharm World Sci 2007; 29:647–654.
14. Sturgess KL, McElnay JC, Hughes CM, Crealey G. Community pharmacy based provision of pharmaceutical care to older patients. Pharm World Sci 2003; 25(5): 218–226.
15. Lyra DP, Kheir N, Abriata JP et al. Impact of pharmaceutical care interventions in the identification and resolution of drug-related problems and on quality of life in a group of elderly outpatients in Ribeirão Preto (SP), Brazil. Therapeutics and Clinical Risk Management 2007; 3(6):989–998.
16. Struck P, Pedersen KH, Moodley P, Rasmussen M. A pilot study of pharmacist-initiated interventions in drug therapy in an Australian pediatric hospital. EJHP Science 2007; 13(4):105-112.
17. Stuchbery P, Kong DCM, DeSantis GN, Lo SK. Identification by observation of clinical pharmacists' activities in a hospital inpatient setting. Pharmacy Practice 2007; 5(1): 10-16.

18. Eichenberger PM, Lampert ML, Kahmann IV, Foppe van Mil JW, Hersberger KE. Classification of drug-related problems with new prescriptions using a modified PCNE classification system. Pharm World Sci 2010; 32:362–372.
19. Krahenbuhl JM, Kremer B, Guignard B, Bugnon O. Practical evaluation of the drug-related problem management process in Swiss community pharmacies. Pharm World Sci 2008; 30:777–786.
20. Cousins D. Current status of the monitoring of medication practice. Am J Health-Syst Pharm. 2009; 66(3):49-56.
21. Van Mil JWF, Schulz M. A review of pharmaceutical care in community pharmacy in Europe. Harvard Health Policy Review 2006; 7(1):155-168.
22. Anderson C, Futter B. PharmD or needs based education: Which comes first? Am J Pharm Educ. 2009; 73 (5) Article 92.
23. Veggeland T, Dyb S. The contribution of a clinical pharmacist to the improvement of medication at a geriatric hospital unit in Norway. Pharmacy Practice 2008; 6(1):20-24.
24. Spinewine A, Dhillon S, Mallet L, Tulkens PM, Wilmotte L, Swine S. Implementation of ward-based clinical pharmacy services in Belgium--description of the impact on a geriatric unit. Ann Pharmacother 2006; 40(4):720-728.
25. Connor SE, Snyder ME, Snyder ZJ, Steinmetz Pater K. Provision of clinical pharmacy services in two safety net provider settings. Pharmacy Practice 2009; 7(2):94-99.
26. Awad A, Matowe L, Capps P. Medical doctors' perceptions and expectations of the role of hospital pharmacists in Sudan. Pharm World Sci. 2007; 29(5):557–564.
27. Whitmarsh S. The realities of professional education: The African context. International Pharmacy Journal 2008; 23(2):34-38.

28. WHO UNESCO FIP Pharmacy Education Taskforce. Newsletter, 2010; 2(5).
29. Montgomery AT, Sporrong SK, Henning M. Tully MP, Lindblad AK. Implementation of a pharmaceutical care service: prescriptionists', pharmacists' and doctors' views. Pharm World Sci 2007; 29:593–602.
30. Altavela JL, Jones MK, BA, Ritter M. A prospective trial of a clinical pharmacy intervention in a primary care practice in a capitated payment system. J Manag Care Pharm. 2008; 14(9):831-43.
31. Wermeille J, Bennie M, Brown I, McKnight J. Pharmaceutical care model for patients with type 2 diabetes: integration of the community pharmacist into the diabetes team – a pilot study. Pharm World Sci 2004; 26: 18–25.
32. Smith WE, Ray MD, Shannon DM: Physicians' expectations of pharmacists. Am J Health Syst Pharm 2002; 59: 50–57.
33. Saira A, Hassali MA, IM Ibrahim M. Doctors' perception and expectations of the role of the pharmacist in Punjab, Pakistan. Trop J Pharm Res, June 2010; 9 (3): 215.
34. Matowe L, Abahussain EA, Al-Saffar N, Bihzad SM, Al-Foraih A, Al-Kandery AA. Physicians' perceptions and expectations of pharmacists' professional duties in government hospitals in Kuwait. Med Princ Pract 2006; 15:185–189.
35. Hassali MA , Awaisu A , Shafie AA, Saeed MS. Professional training and roles of community pharmacists in Malaysia: views from general medical practitioners. Malaysian Family Physician 2009; Volume 4, Number 2&3.
36. Rahmawati F, Pramantara IP, Rohmah W, Sulaiman SA. Polypharmacy and unnecessary drug therapy on geriatric hospitalized patients in yogyakarta hospitals, Indonesia.

International Journal of Pharmacy and Pharmaceutical Sciences, Vol. 1, Suppl 1, Nov.-Dec. 2009.

37. Dooley MJ, Allen KM, Doecke CJ, Galbraith KJ, Taylor GR, Bright J, Carey DL.A prospective multicentre study of pharmacist initiated changes to drug therapy and patient management in acute care government funded hospitals.Br J Clin Pharmacol. 57:4 513–21.
38. Bosma L, Jansman FG, Franken AM, Harting JW, Van den Bemt P. Evaluation of pharmacist clinical interventions in a Dutch hospital setting. Pharm World Sci (2008) 30:31–38.
39. Krahenbuhl J, Kremer B, Guignard B, Bugnon O. Practical evaluation of the drug-related problem management process in Swiss community pharmacies. Pharm World Sci (2008) 30:777–786.
40. Subal CB, Dondeti S. Community Pharmacy Practice in India: Past, Present and Future. Southern Med Review 2009; 2(1): 11-14.
41. Albrecht LC, Roberts AS, Benrimoj CS, Williams KA, Chen TF, Aslani P. Cognitive pharmaceutical services: financial facilitators. Australian pharmacist. 2006; 25(10).

ANNEX I

JIMMA UNIVERSITY SPECIALIZED HOSPITAL

PHARMACEUTICAL CARE PATIENT RECORD

Patient ID…….. **Sex…….**

Address…… **Age……**

Medical conditions……. **Weight……..**

Adverse reactions…….
Tobacco/alcohol/substance use……

Date……//……//……

Subjective findings

Objective findings

Assessment

Plan (recommendations/resolutions)

Follow up

JIMMA UNIVERSITY SPECIALIZED HOSPITAL

PHARMACIST'S RECOMMENDATION

Patient ID…….. Sex…….

Ward…… Age……

ANNEX II
DRP-Registration Form

Age of patient: …….. Sex □ Male □ Female

Name of medication(s): ……

Disease of concern ……..

TYPE OF DRUG THERAPY PROBLEM

Drug therapy problem 1: Unnecessary drug therapy

□ There is no valid medical indication for the drug therapy at this time

□ Multiple drug products are being used for a condition that requires single drug therapy.

□ The medical condition is more appropriately treated with nondrug therapy

□ Drug therapy is being taken to treat an avoidable adverse reaction associated with another medication

□ Drug abuse, alcohol use, or smoking is causing the problem

Drug Therapy Problem 2: Needs Additional Drug Therapy

□ A medical condition requires the initiation of drug therapy.

□ Preventive drug therapy is required to reduce the risk of developing a new condition

□ A medical condition requires additional pharmacotherapy to attain synergistic or additive effects

Drug Therapy Problem 3: Ineffective Drug

□ The drug product is not the most effective for the indication being treated

□ The medical condition is refractory to the drug product

□ The dosage form of thedrug product is inappropriate

 The drug is not effective for the medical problem

Drug Therapy Problem 4: Dosage Too Low

 The dose is too low to produce the desired response.

 The dosage interval is too infrequent to produce the desired response.

 A drug interaction reduces the amount of active drug available

 The duration of drug therapy is too short to produce the desired response

Drug Therapy Problem 5: Adverse Drug Reaction

 The drug product causes an undesirable reaction that is not dose-related

 A safer drug product is required due to risk factors

 A drug interaction causes an undesirable reaction that is not dose-related

 The dosage regimen was administered or changed too rapidly

 The drug product causes an allergic reaction

 The drug product is contraindicated due to risk factors

Drug Therapy Problem 6: Dosage Too High

 Dose is too high

 The dosing frequency is too short

 The duration of drug therapy is too long

 A drug interaction occurs resulting in a toxic reaction to the drug product

 The dose of the drug was administered too rapidly.

Drug Therapy Problem 7: Noncompliance

 The patient doesnot understand the instructions

 The patient prefers not to take the medication

 The patient forgets to take the medication

□ The drug product is too expensive for the patient

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

□ The drug product is not available for the patient

Types of pharmaceutical care interventions

□ No intervention

□ Dosage changed to …….

□ Instructions for use changed to ……

□ Consult physician/other health care professionals

□ Drug Stopped

□ New drug started

□ Patient (medication) counseling

Acceptance of pharmaceutical care interventions

□ Intervention accepted

□ Intervention partially accepted

□ Intervention rejected

ANNEX III

Questionnaire

INFORMED CONSENT SHEET

Assessment of Ward-Based Clinical Pharmacy Services in Jimma University Specialized Hospital: the Case of Internal Medicine

The purpose of this research is to review and document pharmaceutical service and assess the implementation process of clinical pharmacy services in the internal medicine ward of JUSH.

During the data collection time you will be asked to give responses to questions related to personal information and physicians expectations of clinical pharmacists roles. It may take approximately 5 to 10 minutes to complete.

This study would like to provide valuable information on the realization of clinical pharmacy as part of the multidisciplinary team. I am very glad to inform you that you are one of the eligible participants and you are welcome to take part in this study.

Your privacy will be protected by the researchers throughout the study. All information you supply will be kept confidential and used for research purposes only. If you do not agree to participate, you can withdraw participation at any time without penalty.

If you have any questions or concerns about the research project and the research subjects' rights, please contact Alemayehu Berhane (+251913399985), Mr. Sultan Suleman (PhD fellow) or Dr Elias Ali (MD).

I HAVE HAD THE OPPORTUNITY TO READ THIS CONSENT FORM AND ASK QUESTIONS ABOUT THE RESEARCH PROJECT. I AGREE TO PARTICIPATE IN THIS PROJECT BY SIGNING BELOW.

Participants Signature _____ Date_____

Part 1: Personal information

1. Age A) 20-30 B) 31- 40 C) 41- 50 D) >50
2. Sex A) male B) Female
3. Year of practice A) 0- 10 B) 11- 20 C) 21- 30
4. Current position A) specialist B) resident C)general practitioner D) intern

Part 2: physicians' expectation of pharmacists' roles

s.no	Physicians' expectations	Response		
		Agree	Neutral	Disagree
1.	I expect clinical pharmacists to take personal responsibility for resolving any drug-related problems they discover involving patients	1	2	3
2.	I expect clinical pharmacists to be knowledgeable drug therapy experts	1	2	3
3.	I expect clinical pharmacists to assist me in designing drug therapy treatment plans for my patients	1	2	3
4	I expect clinical pharmacists to advise me about more cost effective alternatives to the drugs I prescribe	1	2	3
5	I expect clinical pharmacists to educate my patients about the safe and appropriate use of their medication	1	2	3
6	I expect clinical pharmacists to maintain a complete medication profile on my patients	1	2	3
7.	I expect clinical pharmacists to monitor my patients' response to drug therapy and let me know if a patient encounters any drug-related problem	1	2	3
8.	I expect clinical pharmacists to know the specific indication of each drug I prescribe, even when drugs have more than one approved or recognized indication	1	2	3
9.	I expect clinical pharmacists to be available to me for consultation when I see patients (e.g. during rounds)	1	2	3
10	I expect clinical pharmacists to assist my patients in selecting appropriate non-prescription medications	1	2	3

ANNEX IV

In depth Interview Guide for key informants in JUSH

INFORMED CONSENT SHEET

Assessment of Ward-Based Clinical Pharmacy Services in Jimma University Specialized Hospital: the Case of Internal Medicine

The purpose of this research is to review and document pharmaceutical service and assess ward based clinical pharmacy services in the internal medicine ward of JUSH.

Hello. My name is _____. I am here to conduct viewpoints of the existing pharmaceutical service and implementation of clinical pharmacy services in JUSH. I would like to ask you a few questions about the standard pharmacy services and the pharmaceutical care services delivered in medical ward. During the data collection time you can give as much information as you can. It may take approximately 30 to 60 minutes to complete. Your responses will be recorded by either note taking or an audiotape or both. No personal identifiers will be attached/ recorded. Codes will be used in recording responses. All responses will be kept confidential. Any information we include in our report does not identify you as respondent. Remember, you do not have to talk anything you do not want to and you may end the interview at any time. May I continue?

If the respondent agrees to continue, ask if he/she has any questions. Respond to questions as appropriate, and then ask Q1.

General Information

Date: _____ Time of data collection_____

Interviewee's Title _____Qualification _____

TOPIC GUIDE IN IN-DEPTH INTERVIEW

1. What do you think is the activities of the pharmacy department in JUSH?
2. What is your opinion on the current roles and responsibilities of the pharmacy in health care
3. How does the responsibility of the doctor, the nurse and the pharmacist for the patient's drug therapy relate each other?
4. What is required to achieve a well functioning co-operation between health care professionals and pharmacy staff (for the patients' best interest)? What would it look like?
5. What information do you have about clinical pharmacy service?
6. What do you think is the difference between standard pharmacy service and clinical service?
7. What is the importance of delivering clinical pharmacy service?
8. For future development of competence—what is most important, what is missing, what should be excluded or included?

In depth Interview Guide for pharmacy staffs and pharmacy students

INFORMED CONSENT SHEET

Assessment of Ward-Based Clinical Pharmacy Services in Jimma University Specialized Hospital: the Case of Internal Medicine

The purpose of this research is to review and document pharmaceutical service and assess ward based clinical pharmacy services in the internal medicine ward of JUSH.

Hello. My name is _____. I am here to conduct viewpoints of the pre implementation and implementation of clinical pharmacy services in JUSH. I would like to ask you a few questions about the standard pharmacy services and the pharmaceutical care services delivered in medical ward. During the data collection time you can give as much information as you can. It may take approximately 30 to 60 minutes to complete. Your responses will be recorded by either note taking or an audiotape or both. No personal identifiers will be attached/ recorded. Codes will be used in recording responses. All responses will be kept confidential. Any information we include in our report does not identify you as respondent. Remember, you do not have to talk anything you do not want to and you may end the interview at any time. May I continue?

If the respondent agrees to continue, ask if he/she has any questions. Respond to questions as appropriate, and then ask Q1.

General Information

Date: _____ Time of data collection_____

Interviewee's Title _____Qualification _____

TOPIC GUIDE IN IN-DEPTH INTERVIEW

1. What is your opinion on the current trend shift in pharmacy practice and clinical pharmacy training programme?
2. What do you think is the challenges and opportunities of launching clinical pharmacy training programme in JU?
3. What is your opinion on the current pharmacists working areas and what will be the future?
4. What do you think is the barriers and facilitators to implementation of clinical pharmacy services?
5. In working with the pharmaceutical care service at ward level, what do you think is the most stimulating/satisfying? Challenging / problematic?
6. Has the organizational structure any impact on the delivery of pharmaceutical care services?
7. Has the University's policies and procedures have an impact on the mission and practice standard of pharmacy