AN ASSESSMENT OF IRRATIONAL DRUG USE AT KAPIRI MPOSHI DISTRICT HOSPITAL OUTPATIENT DEPARTMENT

BY

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A dissertation submitted to the Department of Public Health, University of Zambia in partial fulfilment of the requirements for the Masters Degree in Public Health(MPH)

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DECLARATION

I, **Vincent Lukali**, do hereby declare that this dissertation is my own original work. It has been presented in accordance with the guidelines for the MPH dissertation of the University of Zambia. It has not been submitted before for any degree or examination in any other University.

Signed..... Date.....
Vincent Lukali
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Supervisor:

I have read this dissertation and approved it for examination.
Dr C. Michelo
Signature..... Date.....

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I, **Vincent Lukali**, do hereby certify that this dissertation is the product of my own work and in submitting it for my MPH programme further attest that it has not been submitted in part or in whole to another University.

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I, **Dr C. Michelo**, having submitted and read this dissertation, I am satisfied that this is the original work of the author under whose name it is being presented. I confirm that the work has been completed satisfactorily and is hereby ready for presentation to the examiners

Supervisor: **Dr C. Michelo**
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Head of Department

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CERTIFICATE OF APPROVAL

The University of Zambia approves this dissertation of Vincent Lukali in partial fulfilment of the requirement for the award of the Master of Public Health Degree by the University of Zambia.

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ABSTRACT

Background: The irrational use of drugs remains a key health problem in many developing countries. The prevalence of irrational drug use and factors associated with it were investigated at Kapiri Mposhi District Hospital in Zambia.

Methods: The outpatient records (n = 680) of clinical encounters from the hospital registry department for the year 2010 were analysed. The selection process adapted a random sampling method using the patient logbook in order to get a representative sample. Standardised World Health Organization (WHO) prescribing and facility indicators were used to describe irrational drug use. The composite measure of irrational drug use was used to determine the prevalence of irrational drug use at the hospital. Logistic regression was used to assess factors associated with irrational drug use. In addition, a self-administered questionnaire was administered to assess the availability of key medical personnel at the hospital.

Results: Overall prevalence of irrational drug use was 51.4% (n = 680) at Kapiri Mposhi District Hospital Outpatient Department. Disaggregating the composite indicators revealed that antibiotics (65.4%) and polypharmacy (52.2%) were the highest contributors to irrational drug use. A mean of 2.5 (SD 1.07) drugs were prescribed, with a low rate of prescribing by generic name 56.9% (95%CI 52.4-58.8). The proportion of prescriptions for antibiotics was 65.4% (95%CI 61.7-68.9) and for injections, it was 9.7% (95%CI 7.48-11.9). A high percentage of drugs were from the essential drugs list (95.9%) while drug availability was 92%. The essential drug list was not available at the hospital. The availability of prescribers was 55% whereas that of dispensers was 67%. In multivariate logistic regression, polypharmacy was the main determinant of irrational drug use. A one-unit increase in drug use increased the odds of using antibiotics by 2.7 times ($P < 0.001$; OR=2.68, 95%CI 2.20-3.25) and injections by 2.3 times ($P < 0.001$; OR=2.28, 95%CI 1.75-2.97).

Conclusions: The prevalence of irrational drug use at Kapiri Mposhi District Hospital was high suggesting the need for rationalisation. Overuse of antibiotics, polypharmacy and the use of non-generic names were the identified drug-use problems. These findings suggested that there is a need for continuous monitoring of rational prescribing of drugs and strengthening of factors that support the rational use of drugs.

DEDICATION

This research work is dedicated to my late father Maynard Lukali for his good parental guidance and for teaching me the value of hard work and determination. He provided a perfect example and challenged me to finish this work.

To my beloved wife Yvonne Salimo Lukali for her unconditional encouragement and support during the course of my study.

Most of all I pledge allegiance to the Lord Almighty for the strength and encouragement he has given me.

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ABBREVIATIONS/ACRONYMS

WHO - World Health Organisation

MOH - Ministry of Health

EDL -Essential Drugs List

ADRs - Adverse Drug Reactions

KMDMO - Kapiri Mposhi District Medical Office

OPD -Out Patient Department

HC - Health Centre

VCT -Voluntary Counselling and Testing

EMNoC - Emergency Management of Neonatal Obstetric Care

SMAG - Safe Motherhood Action Group.

AIDS - Acquired Immune Deficiency Syndrome

ARI -Acute Respiratory Infection

MTEF - Medium Term Expenditure Fund.

UNZA - University of Zambia

PEM - Protein Energy Malnutrition

STI - Sexually Transmitted Infection

RVD - Retroviral Diseases

CI - Confidence Interval

ENT - Ear, Nose and Throat

DEFINITIONS OF KEY CONCEPTS

Drug/Medicine - means any substance or mixture of substances other than a herbal medicine intended to be used or manufactured for use for its therapeutic efficacy or for its pharmacological purpose in the diagnosis, treatment, alleviation, modification or prevention of disease or abnormal physical or mental state or the symptoms of disease in a person and includes a medicinal product, drug and veterinary medicine (Pharmaceutical act, 2004).

Adverse effect - is a harmful and unintended reaction to medicines that occur at doses normally used for treatment (WHO, 2008).

Dispenser - a person authorised by law to prepare medicines and distribute them to their users (Winfield A.J et al, 2004).

Dispense - to count measure or decant a medicine from a bulk supply or to prepare, mix, dissolve or supply a medicine for the treatment of a person or animal but does not include the administration of medicine (Pharmaceutical act, 2004).

Inappropriate Prescribing - is a manifestation of irrational drug use behaviour when drugs are not prescribed in accordance with guidelines based on scientific evidence to ensure safe, effective and economic use (Quick J.D et al, 1997).

Prescriber - a professional allowed by law to write a directive (prescription) for preparation and administration of a remedy (Winfield A.J et al, 2004).

Prescription - a written directive given by an authorised prescriber directing that a stated amount of a medicine specified in the directive be dispensed for the person or animal named in the directive (Pharmaceutical act, 2004).

Patient - an individual who is the recipient of health care services or one who possesses a unique set of needs, values, beliefs and behaviours that are brought to an interaction with a health care professional.

Polypharmacy - use of two or more therapeutic agents to manage disease states in a patient (Winfield A.J et al, 2004).

Rational drug use - the use of drugs for the right indications, in doses that meet the individual needs of the patient, for an adequate period of time and at the lowest cost (Quick J.D et al, 1997).

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CHAPTER ONE − INTRODUCTION

1.0. Background information

Irrational use of drugs/medicines continues to be a serious and widespread public health problem globally (Oikoumene, 2006). According to WHO estimates, more than half of all medicines are prescribed, dispensed or sold inappropriately and that half of all patients fail to take them correctly (Laing RO et al, 1997). One consequence of this is that, of the worlds five billion people, 75 percent of whom live in the developing countries, 25-50 percent have little or no access to basic pharmaceutical drug availability (Gerald M.C, 1991).

Although irrational drug use is widespread in both industrialized and developing countries (WHO, 1998), it is more pronounced in developing countries. The World Health Organization database of medicines use surveys (ICIUM, 2004), indicate that in Africa, Asia and Latin America, only about 40 percent of all patients were treated in accordance with clinical guidelines. In order to address the problem of irrational drug use especially in developing countries, WHO in 1993 developed a manual for investigating drug use in health facilities. Most studies done using this manual indicated that there was a problem of irrational drug use in most health facilities surveyed and recommended concerted efforts in addressing the problem (WHO/DAP 1993).

According to Degnan (1992), the need for promoting appropriate use of drugs in the health care system is not only because of the financial reasons with which policy makers and managers are usually most concerned. Appropriate use of drugs is also one essential element in achieving quality of health and medical care for patients and the community. The rational use of medicines for all medical conditions is fundamental to the provision of universal access to adequate healthcare, satisfaction of health related human rights and attainment of health related millennium development goals. However the misuse of drugs may be as a result of the ability of the prescribers to make proper prescriptions. Prescriptions are made on the basis of diagnosis and standards in writing a prescription such as the dosage of the drug and

duration based on adequate information about the disease and may vary from prescriber to prescriber. According to a study done by Patel V et al (2005), it was found that the quality of prescriptions made by medical practitioners in Goa India, both in terms of layout and the content of the drugs prescribed is inadequate and that there was need to standardize the format of prescriptions in India so that all essential information is included.

Oikoumene (2006) reported that in the last 20 years progress has been made to promote rational use of medicines. In 1977, WHO established the first model list of essential medicines to assist countries to formulate their own national drug lists. In 1985, the present definition of rational drug use was agreed upon at an international conference held in Kenya. In 1989, the International Network for the Rational Use of Drugs (INRUD) was formed to conduct multi-displinary intervention research projects to promote more rational use of medicines. Following this, the WHO/INRUD indicators to investigate drug use in primary health care facilities were developed and many studies were conducted.

A review of all the published intervention studies were presented at the first International Conference on Improving the Use of Medicines (ICIUM) in Thailand in 1997 and also at the second ICIUM in Thailand in 2004. All the evidence presented at the conference made it clear that misuse of medicines continues to be widespread and has serious health and economic implications, especially in resource poor settings (Oikoumene, 2006).

The meaning of rational use of drugs may vary from one person to the next. However, the conference of experts on the rational use of drugs, convened by the World health organization in Nairobi in 1985 defined that:

"Rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community" (Quick J.D et al, 1997).

Degnan (1992) indicated that these requirements will be fulfilled if the process of prescribing and dispensing is appropriately followed. This will include steps in defining patient's problems (or diagnosis), in defining effective and safe treatments (drugs and non-drugs), in selecting appropriate drugs, dosage and duration, in writing a prescription, in giving patients adequate information and in planning to evaluate treatment responses.

Diseases of bacterial origin constitute a major cause of morbidity and mortality in the developing world (Radyowijati, 2002). Although many of these conditions can be prevented with improved personal hygiene, immunization and environmental sanitation, antimicrobial agents are still the many therapy for many of them. This role has led to high consumption and spending on these drugs. Their widespread use has led to a steady increase of drug resistance. Treatment with medicines is one of the most cost effective medical interventions known, thus it is extremely serious that medicines are being used in an inappropriate and irrational way. At present, large portions of many national drug budgets are devoted to antimicrobial drugs and they are now the largest single group of drugs procured by most non industrialized countries (WHO, 1988). The proportion of national budgets spent on medicines ranges from between 10 and 20 percent in developed countries and between 20 and 40 percent in developing countries (Oikoumene, 2006).

1.1. The Zambian context

In order to ensure that essential drugs and medical supplies are always available at the facility level and they are rationally used, the Zambian Ministry of Health developed and adopted the National Drug Policy in 1999 based on the requirements of the Basic Health Care Package (BHCP). The vision of the National Drug Policy is to provide equity of access to all Zambians to good, quality, safe and efficacious medicines which are affordable and rationally used as close to the family as possible (MOH, 1999). However between 2002 and 2005, the bulk of essential drugs and medical supply was erratic with more than 50 percent of essential drugs out of stock. The availability of the rural health centre kits was fairly steady. In order to strengthen the drug availability and usage, the Ministry of Health undertook a number of activities such as development of the essential drug list, establishment of the Zambia logistic management information system as well as the establishment of the Pharmaceutical

Regulatory Authority in 2004 through an act of parliament. However shortages and inappropriate clinical usage of drugs and medical supplies still remain a major problem (MOH, 2005).

The rational use of medicines is influenced by a wide range of interrelated factors (Quick J.D, 1997). The major forces can be categorized as those deriving from patients, prescribers, the workplace, the supply system including industry influences, regulation, drug information and misinformation and combinations of these factors (Degnan, 1992). This study will focus mainly on the prescriber, the dispenser and the health care system as possible causes of irrational drug use as illustrated in figure one of the problem analysis diagram.

1.2. Statement of the problem

Irrational drug use is a global public health problem, although it mainly affects developing countries such as Zambia. This can be seen in the studies and campaigns on the rational drug use that have been done by the WHO in some developing countries and the development of a manual for investigating drug use in health facilities in 1985 (WHO/DAP 1993).

The vision of the Zambia National Drug Policy states that the government is committed to the provision of equity of access for all Zambians to good quality, safe and efficacious medicines which are affordable and rationally used as close to the family as possible (MOH, 1999). Though attempts have been made by the Zambian government to ensure adequate drug supply, this is only addressing half the problem. Shortages of essential drugs still remain a challenge (MOH, 2005). There is therefore need to address drug use problems and ensure that drug use is rational.

In a drug use survey conducted in Lusaka by Management Sciences for Health (MSH) in collaboration with Lusaka District Health Management Team as a follow up to an earlier survey done in 2002 (Hazemba et al, 2004), it was found that there was still a problem with drug management at the facility level and appropriate remedial measures were needed to be taken. In terms of prescribing practices, it was found that

all facilities surveyed prescribed fewer drugs by generic name than during the previous survey and all facilities also recorded higher use of injections. One third of the facilities surveyed had official treatment guidelines on their premises. The usage of antibiotics was found to be relatively low.

A similar study done by a team of consultants in Uganda and Zambia (Lukwesa C, 2010) using outpatient records of several health facilities showed that 64% of visits in Uganda result in prescription of an antibiotic compared with 41% in Zambia. Antibiotics made up 24.3% of prescriptions in Zambia, and 28% of prescriptions in Uganda. The average number of drugs prescribed per patient was 2.67 in Uganda and 1.76 in Zambia. Injectible drugs are more widely used in Uganda (5%) than in Zambia (1.4%) whereas for young children, syrups and suspensions are slightly more widely used in Zambia.

According to WHO, the optimal number of antibiotics to be prescribed should be less than 30 percent of all the prescriptions surveyed at a given time while injections should be less than 20 percent. The optimal value of the number of drugs per prescription should be less than two drugs. Drugs prescribed by generic name should be 100 percent and all drugs must be prescribed from the essential drug list at an optimal value of 100 percent (Dumoulin, 1998).

In Kapiri Mposhi, the performance assessment report for the first and second quarter 2009 revealed that antibiotic usage for paediatrics was 50 percent and for adults it was 45 percent. Between the period July and December 2010 which was the 3rd and 4th quarter, antibiotic usage increased and was reported to be over 80 percent for both children and adults for outpatients at Kapiri Mposhi District Hospital. The Ministry of Health performance assessment tool indicator for antibiotics demands that the usage of antibiotics in children should be less than 40 percent and in adults less than percent. Although antibiotics are just one parameter in determining whether there is irrational drug use at a health facility, the above percentages suggests that there may a problem of irrational drug use which needs to be investigated further. Moreover literature on irrational drug use in Zambia is limited and though concerns regarding the irrational use of medicines are established, no studies have been done at Kapiri Mposhi District Hospital.

Factors which may influence irrational drug use at the hospital may include the health system, prescribers and dispensers (Quick J.D et al, 1997). The health system may be affected by unreliable supply of drugs, drug shortages, and availability of inappropriate drugs or lack of sensitivity patterns in the use of antibiotics. On the part of prescribers, factors influencing irrational drug use may be inadequate or lack of continuing education, heavy patient load, lack of objective drug information or pressure from peers, patients and drug company representatives. For dispensers, the quality of dispensing may be affected by training and supervision, lack of dispensing materials and short dispensing time due to heavy patient load. The patient and community in general may influence drug use through the beliefs they hold.

The above mentioned factors affecting irrational drug use are guided by proximate-determinant framework which is shown in Figure 1. Proximate-determinants frameworks have been extensively used to structure analyses of fertility (Menken J, 1987), following the work of Davis and Blake (Davis K et al, 1956) and Bongaarts (Bongaarts J, 1978). Key to the framework is the identification of a set of variables, called "proximate determinants," that can be influenced by changes in contextual variables or by interventions and that have a direct effect on mechanisms to influence health outcomes. Figure 1 shows that there are many factors that may lead to irrational drug use. Prescriber, dispenser and patient attitudes may directly influence irrational drug use but they are also influenced by other factors such as level of knowledge, drug shortages and cultural beliefs.

The consequences of irrational drug use can be unbearable on the health system and the community at large. Some of the significant negative effects of inappropriate use of drugs include reduced quality of patient care, negative influence on the outcome of treatment, excessive spending and waste of resources by both patients and the health care system and ultimately patients reliance on drugs for any perceived disease condition. Irrational drug use may also lead to the development of resistance and drug shortages in the health care system (Ambwani S, 1997).

Therefore this study will attempt to describe irrational drug use at Kapiri Mposhi District Hospital Outpatient Department and identify potential problems in their use.

1.3. Rationale

Irrational use of drugs continues to be a serious and widespread public health problem in developing countries such as Zambia. The rational use of medicines for all medical conditions is fundamental to the provision of universal access to adequate health care and the attainment of health related millennium development goals. It is therefore crucial that measures be taken to improve the correct use of medicines by identifying problems associated with their use.

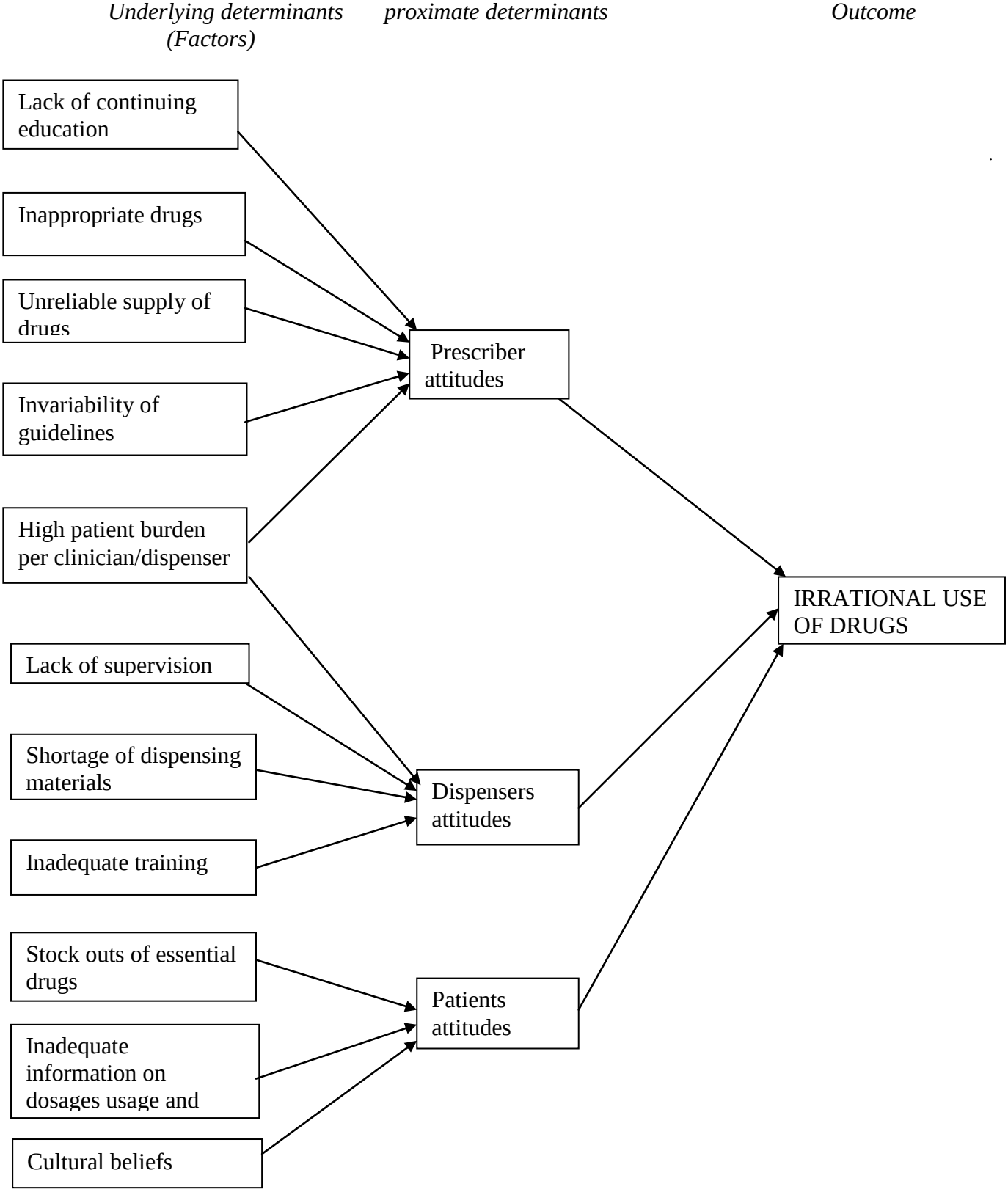
Moreover infectious diseases continue to pose a serious public health problem in Zambia hence the need to ensure that medicines are used appropriately to maximize the benefits and prevent the development of resistance.

Therefore the study will highlight the prevalence of irrational use of medicines in the form of inappropriate prescribing at Kapiri Mposhi district hospital and this information will be useful to health care providers as well as authorities in coming up with appropriate interventions.

The study will provide data on rational use of medicines which is currently not available for intervention in planning, monitoring and evaluation of control programmes.

1.4. Problem analysis diagram:

Figure 1. Factors affecting irrational drug use



Based on the proximate-determinant model. Davis and Blake (1955-56)

CHAPTER TWO − OBJECTIVES

2.0. Research Question

What is the extent of irrational drug use at Kapiri Mposhi District Hospital and what factors could be associated with it?

2.1. Objectives

General Objective

To describe the extent of irrational use of drugs at Kapiri Mposhi District Hospital Outpatient Department.

Specific Objectives

1. To determine the prevalence of irrational drug use (prescribing patterns) at Kapiri Mposhi District Hospital.
2. To identify drug use problems at Kapiri Mposhi District Hospital.
3. To investigate factors associated with the irrational prescribing of drugs.

CHAPTER THREE − RESEARCH METHODOLOGY

3.0. Study Location (site) and population

The study was conducted at Kapiri Mposhi district hospital outpatient department. The outpatient records of clinical encounters were used to describe rational drug use.

Kapiri Mposhi district hospital is situated along the great north road, 65 kilometres south of the town of Kabwe in central province of Zambia. Kapiri Mposhi district hospital is a referral hospital for twenty six rural health centres in Kapiri Mposhi district. The district hospital offers many services such as laboratory, pharmacy, dental, preventive, curative and promotive Services. However, there are no X-ray and theatre services being offered. Those patients who require these services or need specialised care are referred to Kabwe General Hospital (Kapiri Hospital MTEF Strategic Plan, 2010).

The study population consisted of all patient files or prescribing encounters at the hospital outpatient department from which a representative sample was drawn to generalize the results of the research. The study unit was each patient file or prescribing encounter. The sampling frame was all the prescribing encounters in the patient logbook for the year 2010.

3.1. Research Design

The study was a cross- sectional study. A retrospective approach was used where records from the hospital registry department for the year 2010 were studied using the prescribing indicator form and the facility indicator form. A questionnaire was administered to determine the qualifications of personnel involved in the prescribing and dispensing of drugs.

Seven indicators were used in the study, five of which are prescribing indicators and two of which are facility indicators.

The indicators for prescribing practices were used to measure the performance of prescribers in several key dimensions related to the rational use of drugs. The indicators measured the general prescribing tendencies independent of specific diagnosis. The prescribing indicators that were used are:

1. Average number of drugs per encounter.

2. Percentage of drugs prescribed by generic name.

3. Percentage of drugs with antibiotics prescribed.

4. Percentage of encounters with an injection prescribed.

5. Percentage of drugs prescribed from the essential drugs list.

The above indicators were studied from systematically selected patient files or prescribing encounters with names and amounts of prescribed drugs. When measuring antibiotic use, tuberculostatics (antituberculosis), antiprotozoals and antihelminthics agents were excluded. Drugs which were considered to be antibiotics included penicillins, other antibacterials, anti-infective dermatological drugs, anti-infective ophthalmological agents and antidiarrhoel drugs with streptomycin, neomycin, nifuroxazide or combinations. This was based on the WHO model list of essential drugs. Routine immunisations were not counted as injection usage.

The facility indicators determine the availability of specific factors which support rational use of drugs. These are important because the ability to prescribe rationally is influenced by the many features of the working environment, the main ones being an adequate supply of essential drugs and access to unbiased information without which it is difficult for personnel to function effectively. The two facility indicators that were used are:

1. Determining at the time of the visit whether a national essential drugs list or formulary was available.

2. Coming up with a short list of essential drugs to test availability. This short list of the essential drugs was based on WHO model list of key drugs for testing drug availability (WHO/DAP 1993 pages 23-24).

For the purposes of the drug availability indicator above, brand name and generic drugs are chemically equivalent and the presence of any such chemically equivalent form of the listed drug was counted. The quantity of drugs in stock was not considered. Even if only one bottle or a few tablets were available, the drug was recorded as being in stock.

This study tool was adopted because it is considered to be an objective and standard method of assessing rational drug use and prescribing in health facilities by WHO. Studies have been conducted by the WHO using this design in several countries such as Tanzania, Uganda, Malawi, Sudan and Nigeria.

The questionnaire was administered to the hospital administrator at Kapiri Mposhi district hospital in order to determine the availability of key personnel involved in the rational use of drugs. This is because shortages of health personnel tend to have an influence on drug usage as health workers may be overwhelmed with work or other unqualified personnel may be co-opted to help in the handling of drugs. Therefore the number of key health personnel available at Kapiri Mposhi district hospital was compared with the current human resource establishment of the hospital.

3.1.2. Variables of the study

The following variables were measured.

Dependent Variable

The dependent variable in this study was the rational use of drugs.

Independent Variables

The independent variables in this study were

1. Prescribing patterns

2. Drug use problems in prescribing patterns

3. Factors associated with inappropriate prescribing

3.2. Sampling and sample size

A systematic sampling method was used. The total prescribing encounters/patient files covering a period of one year (2010) was used as the sampling frame. This information was obtained from the patient logbook.

Using computer software **EPI-INFO** version 6, the sample size needed for the study was calculated as follows:

Population survey or descriptive study using random sampling.

Population size : 1257

Expected frequency : 50.00%

Worst acceptance : 45.00%

Confidence Level	Sample size
80%	145
90%	223
95%	294

99%	434
99.9%	582
99.99%	**687**

Regarding probability sampling, the sample size was 687 prescribing encounters at 99.99% confidence interval. This was from a population size of 1257, with the expected frequency (incidence) of 50% and using a precision of 5% which brings worst acceptable results at 45%.

The sample size of **687** prescribing encounters or patient files was used because the WHO drug use manual recommends a minimum of 600 prescribing encounters if the results of a drug use study are to be valid and reliable (WHO/DAP 1993).

3.3. Data collection, entry and analysis

3.3.1. Data collection

Conducting the research involved several steps in which quantitative techniques were mainly used.

A. Record Review

Data collection sheets namely the prescribing indicator forms and facility indicator forms were used to collect data retrospectively (Annex 1). The prescribing indicator form was used to collect information from patient files at the outpatient hospital registry. The facility indicator form was used to collect information from the hospital pharmacy. Data collection took one month from the time the ethics committee gave approval.

The following information was collected:

- Average number of drugs per encounter.

- Percentage of drugs prescribed by generic name.
- Percentage of drugs with antibiotics prescribed.
- Percentage of encounters with an injection prescribed.
- Percentage of drugs prescribed from the essential drugs list.
- Availability of a national essential drugs list or formulary at the time of the visit.
- Availability of key essential drugs.

B. Self Administered Questionnaire

Using a structured self administered questionnaire (Annex 2), information on the availability of key personnel involved in the rational use of drugs was collected. The number of key health personnel available at Kapiri Mposhi district hospital was compared with the current human resource establishment of the hospital.

3.3.2. Data processing and analysis

Information obtained was checked and verified. Quantitative data was entered and analyzed using computer software SSPS version 17. Logistic regression was used to determine the associations of dependent variables on one hand and independent on the other. The cut off for statistical significance was set at 5 percent level. Results were edited and presented in graphical and tabular form.

3.3.3. Data quality control

Quality control was achieved by pre-testing the data collection tools at Kapiri Mposhi urban clinic to ensure that the required information was collected. The research assistants were also trained before data collection to familiarize them with the data collection tools and impart skills such as collection and coding of data.

3.4. Ethical Considerations

The study did not involve human subjects and data was collected from patient files strictly for academic and advisory purposes. However because of the confidentiality of information from patient files, approval was sought from the Research Ethics Committee of the University of Zambia (Annex 6.3). No names were used and only numbers assigned to the patient files were entered on the prescribing indicator form.

The records which were collected from the district hospital were kept confidential and were not given to any partner or project for further analysis. The records were allocated numbers that were used to enter as identity on the prescribing indicator form in place of names. The computer was protected with a password to avoid unpermitted assessing of the file.

Permission was also obtained from Kapiri Mposhi district medical office management to conduct the research at Kapiri Mposhi district hospital (Annex 6.1).

3.5. Pre-test/Pilot Study

A pre-test of the data collection tools and procedures was done at Kapiri Mposhi urban clinic outpatient department before the actual data collection. The health facility had similar characteristics to the study population. The activity was important to ensure uniformity in the understanding of research tools and checking of the data spread sheet. The samples used in the pre-test were not used in the actual study for analysis.

CHAPTER FOUR - RESULTS

This section presents research findings. It comprises overall descriptions of prescribing tendencies and factors which support rational drug use. The first part presents the demographic profile of the study setting to allow the readers appreciate the background information and understand the findings in a definite context. The second part analyses the prevalence of irrational drug use in line with the first objective of this study. The third part focuses on prescribing indicators thereby identifying the drug use problems. The fourth part on facility indicators presents findings related to factors associated with irrational drug use. Lastly, a summary of the study findings is presented. The data is presented in graphical and tabular form.

4.0. General Descriptions

Demographic Data

A total of 680 prescribing encounters were surveyed and the proportion of missing information was 1.2 percent**.** This did not affect the validity and reliability as a minimum of 600 prescribing encounters was required. The median age of patients attended to, at the hospital outpatient department was 20 (interquartile range 4, 34 years) as shown in table 4.1 below. The median was used because of the wide variation in age distribution.

Table 4.1 Age profile of patients seen at OPD

Mean	22.9
Median	20
Mode	1
Std. Deviation	19.7
Minimum	1
Maximum	90

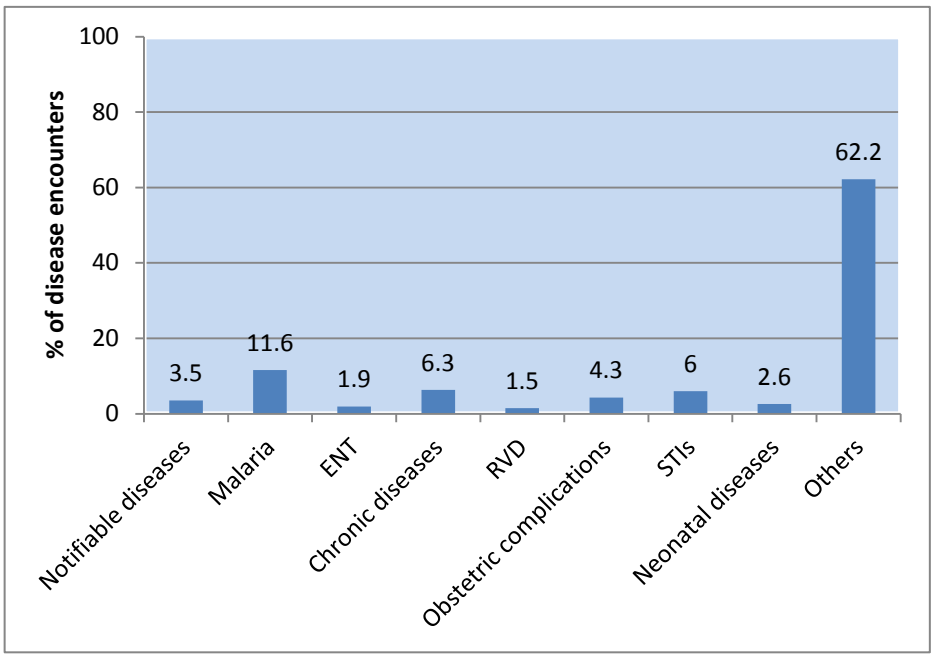
Looking at this age range it is clear that a mostly youthful population n = 680 was attended to at the hospital outpatient department which is generally consistent with the population in Zambia. There were 232 (34.1%) paediatric and 448 (65.9%) adult records.

Table 4.2. Sex of patients seen at OPD

	Frequency	Percentage
Male	331	48.7
Female	349	51.3
Total	680	100.0

Table 4.2 shows that there were slightly more females (51.3%) seen at the hospital outpatient department as compared to males (48.7%).

Figure 4.1. Prevalence of diseases



In figure 4.1 above, the top causes of diseases in this study were others (62.2%) and malaria (11.6%) whereas the least were ENT (1.9%) and RVD (1.5%). Diseases where categorized according to the Zambian Health Management Information System (HMIS). These diseases were consistent with those of the Kapiri Mposhi MTEF Strategic Plan (2010).

4.1. Prevalence of irrational drug use

The prevalence of irrational drug use was found to be 51.4 percent using the composite measure of irrational drug use as shown in table 4.1.1.

Table 4.1.1. Composite measure of irrational drug use

Indicator	Number (n)	Weights(n/N)	Percentages x weights
Antibiotics Given	445 (65.4%)	0.37	24.2
Non Generics	293 (43.1%)	0.25	10.8
Injections Given	66 (9.7%)	0.06	0.6
Average number of drugs (Polypharmacy)	355 (52.2%)	0.30	15.7
Number of drugs not on EDL	28 (4.1%)	0.02	0.1
TOTAL	**N =1187**		**51.4**

As can be seen from the table above, antibiotics (65.4%), polypharmacy (52.2%) and use of non generics (43.1%) were the highest contributors to irrational drug use.

4.2. Prescribing indicators

The prescribing indicators measured the performance of prescribers in five aspects of rational use of drugs as follows;

4.2.1. Average number of drugs per encounter

In table 4.2.1.1, the mean number of drugs per encounter was 2.44 (SD ±1.07). This was higher than the WHO standard of less than 2 drugs per encounter. There was no difference in the median and mode in the sample.

Table 4.2.1.1 Average number of drugs per encounter

Mean	2.4
Median	3
Mode	3
Std. Deviation	1.1
Minimum	0
Maximum	6

4.2.2. Percentage of encounters with an antibiotic and injection prescribed

In table 4.2.2.1, the percentage of patients receiving an antibiotic was 65.4 percent (CI 61.7, 68.9) of the total sample surveyed. This was higher than the WHO standard of less than 30 percent.

Table 4.2.2.1. Antibiotic encounters

Prescribing encounter	Frequency	Percent
Not given an antibiotic	235	34.6
Given an antibiotic	445	65.4
Total	680	100.0

When the usage of antibiotics was compared to disease in table 4.2.3.2, the highest usage of antibiotics was in STIs (78%), ENT (76.9%) and others (67.6%). It was also observed that antibiotics were used in the treatment of malaria (60.8%). This is a concern as this is not in line with the standard treatment guidelines.

Table 4.2.2.2. Diseases versus antibiotics

Diseases	Antibiotics		Total
	Not given an antibiotic	Given an antibiotic	
Notifiable diseases	10 (41.7%)	14 (58.3%)	24
Malaria	31 (39.2%)	48 (60.8%)	79
Ear, nose and throat (ENT)	3 (23.1%)	10 (76.9%)	13
Chronic diseases	18 (41.9%)	25 (58.1%)	43
Retro viral disease (RVD)	5 (50%)	5 (50%)	10
Obstetric complications	13 (44.8%)	16 (55.2%)	29
Sexually transmitted infections (STIs)	9 (22%)	32 (78%)	41
Neonatal diseases	9 (50%)	9 (50%)	18
Others	137 (32.4%)	286 (67.6%)	423
Total	235	445	680

In table 4.2.2.3 below, the average percentage of patients receiving one or more injections at the hospital was found to be 9.7 % (95%CI 7.48, 11.9). This falls within the limit required by WHO (< 20%) and indicates good performance on the part of the prescribers.

Table 4.2.2.3. Injection encounters

Prescribing encounter	Frequency	Percent
Not given an injection	614	90.3
Given an injection	66	9.7
Total	680	100.0

When the usage of injections was compared against diseases in table 4.2.2.4, the highest usage of injections was in notifiable diseases (16.7%) and neonatal diseases (16.7%). The lowest use of injections was in ENT (0%). Generally the usage of injections was low as shown in table 4.3.2.3.

Table 4.2.2.4. Diseases versus Injections

Diseases	Injections		Total
	Not given an injection	Given an injection	
Notifiable diseases	20 (83.3%)	4 (16.7%)	24
Malaria	73 (92.4%)	6 (7.6%)	79
Ear, nose and throat (ENT)	13 (100%)	0 (0%)	13
Chronic diseases	41 (95.3%)	2 (4.7%)	43
Retro viral disease (RVD)	9 (90%)	1 (10%)	10
Obstetric complications	27 (93.1%)	2 (6.9%)	29
Sexually transmitted infections (STIs)	37 (90.2%)	4 (9.8%)	41
Neonatal diseases	15 (83.3%)	3 (16.7%)	18
Others	379 (89.6%)	44 (10.4%)	423
Total	614	66	680

4.2.3. Percentage of drugs prescribed by generic name

In table 4.2.3.1, the average percentage of generic names prescribed was 56.9 % (95%CI 52.4, 58.8). This was much lower than the WHO standard of 100 percent. Brand names such as panadol, flagyl and septrin were common in most encounters.

Table 4.2.3.1. Drugs prescribed by generic name

Prescribing encounter	Frequency	Percent
Non Generics	293	43.1
Generics	387	56.9
Total	680	100.0

4.2.4. Percentage of drugs prescribed from essential drugs list or formulary

In table 4.2.4.1, the average percentage of drugs prescribed that were on the essential drugs list was 95.9 % (95%C.I 88,104) close to the WHO standard of 100 percent. This result is expected considering that most drugs at the hospital are supplied by Medical Stores Limited whose drugs are procured by the Ministry of Health. The Ministry of Health is guided by the Zambian essential drug list when procuring drugs.

Table 4.2.4.1. Drugs on the essential drug list (EDL)

Prescribing encounter	Frequency	Percent
Drugs not on EDL	28	4.1
Drugs on EDL	652	95.9
Total	680	100.0

4.3. *Health facility indicators*

In figure 4.3.1, the percentage of available key drugs was 92 % (95%C.I 81,103). This was relatively good as most drugs for common diseases were available. However figure 4.3.1 also shows that the essential drug list or formulary was not available at the hospital at the time of the study.

FIGURE 4.3.1. A graph showing availability of health system support tools at Kapiri Mposhi district hospital

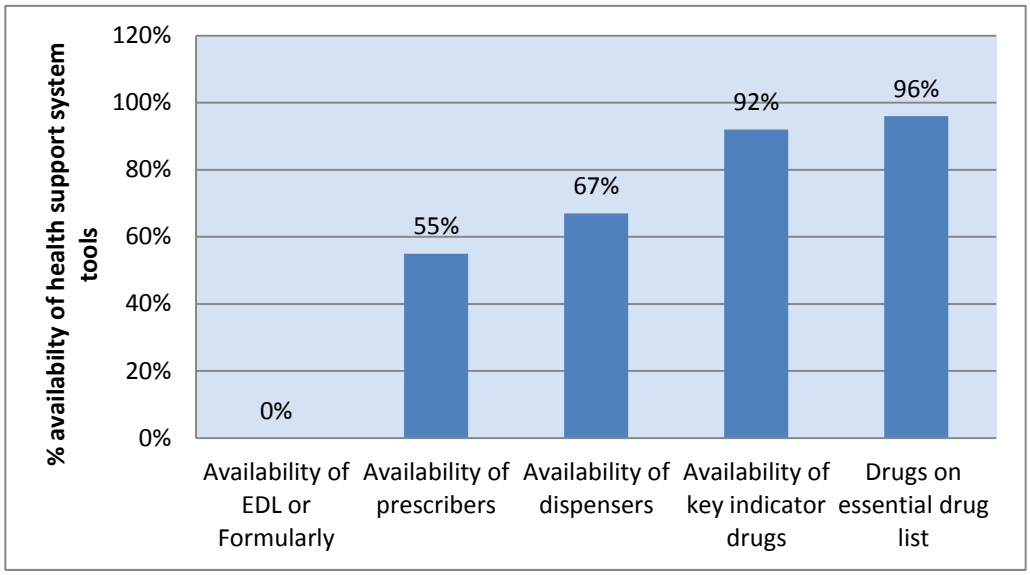
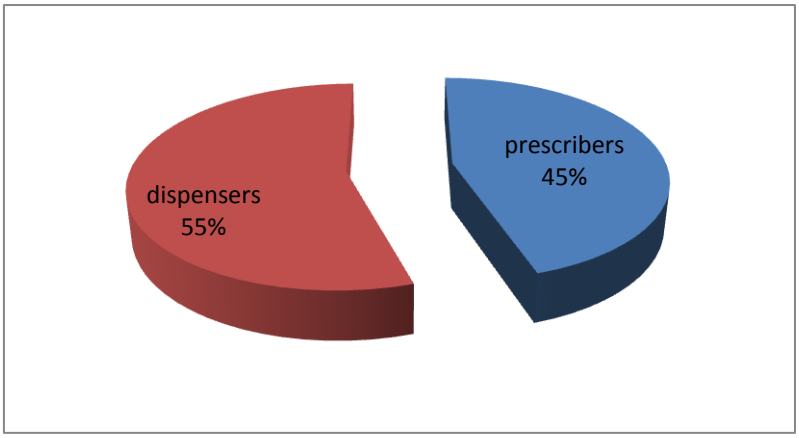


FIGURE 4.3.2. A graph showing availability of prescribers and dispensers.



Figures 4.3.1 and 4.3.2 show that the availability of prescribers was 55 % who were either medical doctors or clinical officers. The mostly affected cadre in terms of unavailability were the clinical officers who filled only half of the hospital establishment whereas as medical doctors made up three quarters of the hospital establishment. In Figure 4.3.2, the availability of qualified dispensers was 67 % with

only one dispenser lacking. The hospital establishment however did not have the position of pharmacist at the time of the study.

Table 4.3.1. Predictors of antibiotics use

Predictors	Odds ratio	95% CI	P value
Age	1.00	0.99-1.01	0.543
Number of drugs	2.68	2.20-3.25	< 0.001
Sex(females)	0.01	0.00-0.01	< 0.001

Table 4.3.1 shows that a one unit increase in drug use increases the odds of using antibiotics by 2.7 times greater whereas females as compared to males had a (1- 0.01) ~ 99 percent reduced chance of getting antibiotics and was not influenced by age (P = 0.543).

Table 4.3.2. Predictors of injection use

Predictors	Odds ratio	95% CI	P value
Age	0.99	0.98-1.01	0.267
Number of drugs	2.28	1.75-2.97	< 0.001
Sex	1.04	0.57-1.67	0.921

Table 4.3.2 shows that a one year increase in age reduces the odds of using injections by (1-0.99) ~ 1 percent and one unit increase in drug use increases the odds of using injections by 2.3 times greater and was not influenced by sex (P = 0.921).

TABLE 4.3.3. A summary of comparative drug use indicators for the study and their mean at Kapiri Mposhi district hospital.

	Indicator	WHO standard Values	Study findings	95% Confidence interval
1.	Average number of drugs prescribed	< 2	2.4	
2.	Percentage of drugs prescribed by generic name	100%	56.9%	52.4-58.8
3.	Percentage of encounters with an antibiotic	< 30%	65.4%	61.7-68.9
4.	Percentage of encounters with an injection	< 20%	9.7%	7.5-11.9
5.	Percentage of drugs from essential drug list	100%	95.9%	88.2 -104.5
6.	Availability of essential drug list or formulary.		NO	
7.	Percentage of availability of key indicator drugs		92%	81-103

Table 4.3.3 gives a summary of the study findings in relation to WHO standard values. The table shows that the hospital performed well in following indicators namely percentage of encounters with injections 9.7 % (95%CI 7.48 – 11.9), percentage of drugs from the essential drug list 95.9 % (95%CI 88.2 – 104.5) and percentage of availability of key indicator drugs 92 % (95%CI 81 - 103).

CHAPTER FIVE − DISCUSSION OF FINDINGS

This section presents a summary of the research findings to give a general overview of the key findings to the readers and then discusses methodological issues related to the study, particularly those which emerged as the most central topics to the research design and approach of the present work. It ends by discussing the main findings of the thesis and their impact on the health care delivery system.

5.0. Summary of findings

The findings of this study showed a 51.4 percent prevalence of irrational drug use at Kapiri Mposhi district hospital which was alarming. Of the five prescribing indicators, the health facility did not perform well in the average number of drugs per encounter (a mean of 2.5 drugs prescribed per encounter), low rate of prescribing by generic name 56.9 percent (CI 52.4, 58.8) and overuse of antibiotics 65.4 percent (CI 61.7, 68.9). Health support system tools such as the essential drug list were not available at the facility and human resource was inadequate. Using multivariate analysis, our study showed that in both antibiotic and injection use, one unit increase in number of drugs increased the odds of using either injections or antibiotics by more than 2 times (see tables 4.4.1 and 4.4.2)

5.1. Design

The design of this study was mainly adapted from the WHO drug use manual (WHO/DAP 1993) which contains a set of selected indicators intended to measure rational drug use at a health facility. The indicators mainly used in this study were prescribing and facility indicators. Admittedly these indicators do not measure all the aspects of the appropriateness of pharmaceutical care. Determining the quality of diagnosis and evaluating the adequacy of drug choices is a complex undertaking in practice and beyond the scope of these indicators. Thus these indicators are best understood as first line measures intended to stimulate further questioning and guide subsequent action. After a first drug use study with selected indicators has been carried out to determine overall prescribing performance, it is usually necessary to undertake more health problem- specific investigations and make an assessment of the quality of diagnosis and treatment.

The present study mainly used quantitative methods in collecting data. This may have been a limitation as it did not enhance our understanding of the diverse aspects of irrational drug use at the district hospital. Inclusion of qualitative methods such as in-depth interviews and focused group discussions would have added to the richness of this thesis as more evidence would have been made available. For example, while prescribing indicators where used to collect information from patient files on prescribing performance, no prescribers where interviewed. The prescribers as well as other health care providers would have added a wealth of information to some of the identified drug use problems in this study. However it must also be noted that a mixed design method does not guarantee that the quality of the findings will be strengthened (Creswell.J, 2011). Use of mixed research methods may be more time consuming and demanding for the researcher or research team to master the data collection and analysis techniques of two different research methods. Therefore while the researcher acknowledges that using qualitative methods would have added to the wealth of information, focusing on one methodological approach enabled the researcher to develop more detailed knowledge and better skills within the particular research method, which have been reflected in the quality of the study presented. Because quantitative methods left out certain key elements of irrational drug use, an attempt was made to administer a self administered questionnaire.

5.2. Bias considerations

Selection bias

Selection bias occurs when individuals are differentially enrolled into a study (Rothman K.J, 1998). According to Madhukar Pai (1999), sources of selection bias in a cross sectional study includes bias due to sampling and bias due to non participation or non response. In the present study, bias due to sampling was tackled by getting the study sample from a well defined population. All patient files for a period of one year were considered to minimize biases due to seasonal variations or interruptions in the drug supply cycle. The sampling frame was the patient log book for the period under review. In selecting the study sample, probability sampling methods were used to ensure that all units of the study population had an equal or at least a known chance of

being included in the sample. In this study we used systematic sampling where patient files were chosen at regular intervals from the sampling frame. In terms of bias due to non participation or non response, the files or study units which lacked information accounted for only 1.2 percent which was very low, as such the required sample size for this study was not affected. We believe therefore that selection bias is unlikely to have affected the internal as well as external validity of study results.

Perhaps the limitation to the present study could have been that study site was selected purposively due to cost and convenience considerations. It was felt that since the district hospital acted as a referral centre for all the 26 health centres in Kapiri Mposhi, the sample would be representative. However sampling district hospitals across the country or in a particular region would have reduced bias.

Measurement bias

Measurement bias may result if there are measurement errors or information is not accurately obtained and can lead to non- differential or differential misclassification (Rothman K.J, 1998).

In the present study, prescribing and facility indicators were used to measure irrational drug use and were adapted from the drug use manual developed by WHO (WHO/DAP 1993). These indicators have been extensively reviewed and field tested in many developing countries such as Sudan, Uganda, Malawi, Tanzania and Nigeria. We therefore believe that the study variables were measured accurately. Moreover the study tools were pre-tested before the study commenced and the research assistants were thoroughly trained. At the end of each day of data collection, the researcher met with the research assistants to verify the data collected and ensure that it was complete and of good quality. The researcher also went out regularly with the research assistants to ensure that agreed procedures were being followed. We therefore have no reason to believe that the study variables were not measured accurately.

Interviewer bias occurs when the interviewer influences the participant's answers. This can be a concern in trials when data are collected face to face. In the present

study, we administered a written questionnaire and believe that we did not influence the responses of the respondent.

Measuring the prevalence of irrational drug use was challenging. This is because the design from which this study was adapted from does not have methods for measuring prevalence of irrational drug use. Moreover the researcher did not come across studies that measure the prevalence of irrational drug use. Thus the researchers had to come up with a scale to measure the prevalence of irrational drug using the prescribing indicators. This was called the composite measure of irrational drug use. This measure or scale used weighted averages of each of the indicators to come with an overall prevalence measure of irrational drug use (see table 4.2.1).The indicators which had the highest weights contributed more to the overall measure of irrational drug use. Concerns about measurement bias should be raised when researchers use a scale which is not validated to measure a complex phenomenon such as irrational drug use. The researcher admits that we may not have fully captured the prevalence of irrational drug use with our scale. However while we did not use a validated scale, the performance of the prescribing indicators suggests that this could have been a true value. Moreover the scale added to the richness of this study and we suggest that other researchers take up this scale and develop it further.

Reproducibility of results

Validity denotes the extent to which the study actually measured what it was supposed to measure and therefore says something about the quality of the research (Rothman K.J, 1998). Reliability on the hand implies that someone else using the same method in the same circumstances should be able to obtain the same findings. This study used validated indicators (WHO/DAP 1993) and the findings of the study were consistent with other studies done in Zambia and other developing countries. Moreover bias considerations were taken into account in this study.

5.3. Irrational drug use and its indicators

Prevalence of irrational drug use

The prevalence of irrational drug use at Kapiri Mposhi District Hospital was found to be 51.4 percent using the composite measure of irrational drug use which was high. This prevalence was reflected in the performance of drug use indicators which will be discussed below. Such a high prevalence of irrational drug use impacts negatively on service delivery in healthcare. According to WHO (2000), increase in the prevalence of irrational drug use may lead to drug resistance which is costly.

Prescribing indicators

Prescribing indicators are used to measure the performance of prescribers in several key dimensions related to the rational use of drugs and are discussed below as follows;

a) Average number of drugs

The average number of drugs indicator measures polypharmacy. Polypharmacy is the use of two or more therapeutic agents to manage disease states in a patient (Winfield A.J et al, 2004). In our study, the average number of drugs per prescription was found to be 2.4 (SD 1.07). This is similar to that reported by Hazemba et al (2004) in Lusaka, Zambia. However it is lower compared to studies conducted by Odusanga (2004), Patel et al (2005), and Bashrahil (2010) in Nigeria, India and Yemen respectively which ranged from 2.8 to 3.5. Although polypharmacy was evident in the present study it was lower compared to studies in other countries. Lesser number of drugs is a positive sign as polypharmacy is known to be a contributing factor for hospitalizations (Quick et al. 1997).

When the association between number of drugs and injection use or antibiotic use was tested, it was found in one unit increase in the number of drugs resulted in more than 2 times increase in antibiotic and injection use ($p< 0.001$). This implies that the more drugs we use, the more likely we are to increase antibiotic and injection use. There is

therefore need to reduce polypharmacy further. Polypharmacy can be caused by a number of factors. One possible explanation is symptomatic treatment due to lack of adequate laboratory facilities. In Bangladesh, more than 90 percent of antibiotics were used on an empirical basis due to limited availability of facilities for microbiological testing, unreliable results and frequent differences in test outcomes from different laboratories (Rashid et al, 1986). In Zambia most district hospital laboratories are ill equipped to conduct needed tests (Lukwesa C, 2010).

b) Drugs prescribed by generic name

Using generic names implies referring to the chemical name of a drug. Our study reported that only 56.9 percent (CI 52.4, 58.8) drugs were prescribed by generic name. Our value is less compared to that reported by Patel V et al (2005) in India (73%), and by Otoom et al (2002) in Jordan (93%) but higher than that reported by Hamed el faki (2010) in Sudan (37.2%) and by Hazemba et al (2004) in Zambia (31%). Our study reflects minimal prescribing of generic names by prescribers at the district hospital. Changing this situation requires sensitization of prescribers on the essential drug list as opposed to merely distributing them. This is important because various cadres such as clinical officers and nurses are involved in prescribing apart from doctors at outpatient departments in district hospitals. As a result of shortage of personnel, doctors may restrict themselves to seeing inpatients and specialized clinics only. Thus sensitizing all health workers involved in prescribing is important standardizing prescribing. However this requires political will by the Ministry of Health. Prescribing by generic name helps the hospital pharmacy to have a better inventory control and purchase drugs on contract basis, as the number of drugs is less. It can also reduce confusion among pharmacists while dispensing. Prescribing by brand name may be evidence of vigorous promotional strategies by pharmaceutical companies (WHO 2002).

c) Antibiotics and injections prescribed

Our study indicated that percentage of encounters where antibiotics were prescribed was 65.4 percent (CI 61.7, 68.9) This value is quite high compared studies done by Kamaruzaman et al (2006) in Malaysia (23.2%) and Odusanga (2004) in Nigeria (55%) but almost similar to that done by Otoom et al (2002) in Jordan (60.9%), Bashrahil (2010) in Yemen (66.2%) and Hamed el faki in Sudan (72%). The overuse of antibiotics was observed to be a problem at Kapiri Mposhi district hospital. This could be attributed to lack of microbial sensitive tests resulting in empirical treatment (Lukwesa C, 2010). Overuse of antibiotics can lead to serious clinical problems such as the development of superinfections, allergies and other health hazards. According to WHO (2000), antibiotics misuse has contributed to the worldwide increase in antimicrobial resistance that is now being observed in major infectious diseases including tuberculosis, gonorrhoea, malaria, bacterial diarrhoea and pneumonia. It is therefore important to promote judicious use of antibiotics to limit the spread of the emergence of resistance.

The highest number of antibiotics were prescribed in diseases such as STIs (78%), ENT (76.9%) and others (67.6%), see table 4.3.2.2. It was also noted that antibiotics were also being used in the treatment of malaria (60.8%). The use of antibiotics in malaria is a concern as the Zambian treatment guidelines do not recommend the use of antibiotics in treating malaria (MOH, 2009). The antibiotics which were found to be commonly used in this study were amoxicillin, cotrimoxazole and doxycline. These results were similar to that reported by Hazemba et al (2004) in Zambia but slightly different from a study done by Odusanya (2004) in Nigeria in which ampicillin+cloxacillin, ciprofloxacin and amoxycillin were the most frequently prescribed antibiotics. This difference could be attributed to differences in disease patterns where the main indications for antibiotic therapy in Nigeria were malaria, acute upper respiratory tract infections and typhoid fever.

Using multivariate analysis, our study showed that females as compared to males had 99 percent reduced chance of getting antibiotics ($p < 0.001$). This is similar to a study done by Clavenna et al (2009) in which the prevalence of drug use (mainly antibiotics) was slightly higher in boys than in girls for all ages ($p < 0.001$). The

researcher however did not expect this result as females tend to seek health services more than males due to gender differences in health seeking behaviour linked to customary gender roles and traditional perceptions of the male gender role (Courtenay W.H, 2000).

The percentage of encounters where an injection was prescribed was found to be 9.7 percent (CI 7.48, 11.9). This was low compared to that reported by Odusanga (2004) in Nigeria (14%) and Bashrahil (2010) in Republic of Yemen (46%). However it was higher compared to that reported by Otoom et al (2002) in Jordan (1.2%), Kamaruzaman et al (2006) in Malaysia (1.7%) and Patel v et al (2005) in India (0.2%) implying that there is still room for improvement. Overall, injection use at the district hospital was low.

Injection use is influenced by cultural beliefs (Quick *et al.* 1997). According to WHO (1996), a lot of patients and even health workers in many countries think that injections are more effective than tablets. In the present study, injection use was low which was commendable. To sustain this result, there is need for continuous health education to both prescribers and patients on the disadvantages of injection use such as they are inconvenient, more expensive, less safe, painful and require skilled personnel to administer.

It was observed in our study that a one year increase in age reduced the odds of using injections ($p < 0.267$) by about 1 percent. This was similar to a study done by fernandez-liz et al (2008) in which age ($p < 0.001$) produced a statistically more significant effect than gender ($p < 0.05$). This was consistent with our findings (see table 4.3.5) in which the highest use of injections was recorded in notifiable diseases (16.7%) and neonatal diseases (16.7%) which affected mainly children.

d) Drugs prescribed from essential list or formulary

With regard to the essential drug list, the percentage of drugs prescribed from the essential drug list of Zambia was 95.9 percent (C.I 88,104). This is high compared to that reported by Bashrahil (2010) in Yemen (81.2%) and by Otoom et al (2002) in Jordan (93%). Despite the non availability of the EDL at the district hospital, this value is impressive and is an indicator of rational drug prescribing and use.

Facility indicators

Facility indicators are health support system tools which help with proper delivery of health services at a health facility such as availability of key drugs and availability of drug information such as essential drug list. Though facility indicators only measure these two indicators, the researchers added an additional tool namely human resource as it was felt that this may equally impact on irrational drug use. This was done by administering a self administered questionnaire.

a) Availability of key indicator drug.

Availability of key indicator drugs accounted for 92 percent (C.I 81,103) of the total drugs surveyed. This is higher compared to studies carried out by Patel et al (2001) in India (85%) and Bashrahil (2010) in Yemen (81.2%). This implies that in terms of drug availability, Kapiri Mposhi District Hospital performed well. Drug supplies are a key component of the health delivery system. Failure to provide adequate and efficacious drug supplies impacts negatively on the ability of health facilities to provide healthcare (Guyon 1994).

b) Availability of the national essential drugs list or formulary.

The hospital had no essential drugs list or formulary at the time of the study. The current essential drug list (MOH, 2009) contains a list of essential drugs and standard treatment guidelines. These guidelines should be readily available at the hospital. The main purpose of the guidelines in the health care system is to standardize the management of patients. If health workers adhered to these guidelines, irrational drug use such as the overuse of antibiotics would be minimized.

c) Human resource

In terms of medical personnel, our study showed that the availability of prescribers was 55 percent and that of dispensers was 67 percent against the hospital establishment. According to the Kapiri Mposhi MTEF strategic plan (2010), there were 1215 outpatients attended to and 7867 admissions at the hospital for the period

under review. This high number of patients could have added additional pressure on the inadequate human resource thereby contributing to irrational drug use at the hospital. According to Oikoumene (2006), shortage of qualified health personnel in public health facilities has resulted in inadequate labelling of medicines and insufficient time spent to inform consumers on how to take their medicines by prescribers and dispensers. Therefore, there is need for the Ministry of health to ensure that the establishment of the hospital is completely filled up so as to ensure quality service delivery to the patients.

5.4. Impact Considerations

The vision of the Zambia national drug policy states that the government is committed to the provision of equity of access for all Zambians to good quality, safe and efficacious medicines which are affordable and rationally used as close to the family as possible (MOH, 1999). Unfortunately in the presence of irrational use as revealed by the present study, this vision becomes untenable. Medicines are an integral part of health care and modern health care is unthinkable without the availability of necessary medicines. They not only save lives and promote health, but prevent epidemics and diseases too (Kar sekhar et al, 2010)

Though we did not investigate the impact of irrational drug use at the district hospital as this may have taken a considerable amount of time, similar studies (Gurbani N, 2011) have shown that irrational drug use impacts negatively on health care delivery system in the following ways;

a) *Disease burden* -Reduction in the quality of medicines therapy may lead to an increase in morbidity and mortality. This may consequently result in an increase in disease burden. According to the Zambia Demographic and Health Survey (2007), the burden of disease in Zambia is high and is characterized by a high prevalence of communicable diseases, a growing burden of non communicable diseases, high maternal and child morbidity and mortality.
b) *Drug Resistance* - Increased risk of unwanted effects such as adverse medicine reactions and the emergence of medicine resistance, for example malaria or multiple medicine resistant tuberculosis. In Zambia as a result of widespread

chloroquine and sulphadoxine-pyrimethamine (SP) resistance, a decision was made to change the National Drug Policy to artemether-lumefantrine therapy in 2002 (Sipilanyambe et al, 2008).

c) *Cost considerations* - irrational drug use may lead to waste of resources leading to reduced availability of other vital medicines and increased costs. Irrational prescribing can lead to higher pharmaceutical expenditures due to the inclusion of unnecessary or inappropriate products, unnecessarily expensive products, and excessively high doses or long treatment periods. In many developing countries, prescriptions for five or more drugs are not uncommon (Foster, 1993). Data from one study indicated that pharmaceutical spending in health centres could have been reduced by as much as 70% if treatment recommendations had been followed (Barnett A, 1980).

d) *Psychosocial impacts*, such as when patients come to believe that there is "a pill for every ill". This may cause an apparent increased demand for medicines. This is especially true in conditions such as colds where patients may even take antibiotics to alleviate the symptoms. According to Radyowijati (2002), drug use is influenced by cultural preferences and beliefs.

CHAPTER SIX − CONCLUSION AND RECOMMENDATIONS

6.0. *The key concluding remarks are as follows*;

The study revealed that the prevalence of irrational drug use at Kapiri Mposhi District Hospital was high (51.4%) and therefore requires rationalization. Overuse of antibiotics, polypharmacy and use of non generic names were the highest contributors to the prevalence of irrational drug use. Consequently these were the identified drug use problems.

Health support system tools such as lack of the essential drug list and low availability of medical personnel were identified to have contributed to irrational drug use. Using multivariate analysis, it was observed that an increase in the number of drugs increased the likelihood of either prescribing an antibiotic or injection ($p < 0.001$).

This study demonstrated the magnitude of the problem of irrational drug use at the district hospital and is vital in providing necessary data to monitor trends in drug use at the hospital. The findings indicate that irrational drug use at the Kapiri Mposhi District Hospital is similar to other studies done in other developing countries.

6.1. *Policy implications and future research*

a) Research - The findings of this study imply that there is need for continuous operational research in health facilities in Zambia considering the magnitude and impact of irrational drug use. The drug use indicators used in this study provide a quick and reliable tool of assessing a few critical aspects of pharmaceutical care in primary health care. These indicators are valuable in providing evidence based interventions by district and hospital management teams. This implies that DHMTs should ensure that funds are allocated for operational research during their annual planning cycles if quality health care delivery is to be achieved.

b) Policy – The results of the present study provide a strong argument of the need for monitoring and evaluation of irrational drug use. The study demonstrated that there were drug use problems in prescribing such overuse of antibiotics, polypharmacy and low use of generic names. Similar results were obtained in a similar study done by

Hazemba (2004) in Lusaka, Zambia. It is likely that this could be a countrywide problem. Therefore the Ministry of health should conduct monitoring and evaluation, and give feedback to health workers by developing and implementing interventions about drug use in order to improve prescribing practices and rational use of drugs. This can be done by strengthening of the health performance assessment tool indicators through the use of validated drug use indicators as part of monitoring and evaluating the implementation of the National Drug Policy. Also policies on antibiotic usage can be implemented by limiting prescription of antibiotics by level of prescriber and ensuring that all recommended prescribers submit their names and signatures to the pharmacy department so that these are monitored.

c) Service delivery – Irrational drug use is one of the factors that contribute to a high burden of disease as a result of reduction in the quality of medicines therapy. High disease burden impacts negatively on the health care delivery system due to rising costs, drug shortages, overworked health staff, high morbidity and mortality. Therefore there is need to strengthen health education strategies to health workers as well as the community on the rational use of drugs. Research should be ongoing to assess the impact of these interventions and where necessary adopt more efficient ones. The Pharmaceutical Regulatory Authority in Zambia has a pharmacovigilance unit which is responsible for monitoring adverse events due to drugs (MOH, 2005). One of the impacts of irrational drug use is increased risk of unwanted effects. It is therefore not sufficient for the pharmacovigilance unit to monitor adverse medicine reactions alone without assessing irrational drug use. We therefore recommend that the pharmacovigilance unit be strengthened so as to monitor irrational drug use in health facilities and where possible drug resistance patterns.

6.2. *This study recommends the following;*

- The present study used mainly quantitative methods to assess irrational drug use at kapiri Mposhi district hospital. As earlier discussed, irrational drug use is a complex issue. Further studies should be done using qualitative methods to gain a broader understanding of issues affecting irrational drug use such as attitudes and perceptions.
- Antibiotics should also be prescribed with care. This can be done by limiting prescription of antibiotics by level of prescriber and ensuring that all recommended prescribers submit their names and signatures to the pharmacy department so that these are monitored.
- More effort is needed to ensure that local drug information resources such as the national standard treatment guidelines and the national formulary of essential drugs are available at the hospital. A hospital formulary encompassing the national drug list is required. The drug and therapeutics committee of the hospital should take the leading role in rationalizing the prescribing and dispensing pattern at the hospital.
- Continuing education about the rational use of drugs of all health workers is required. Also disease prevention and rational drug use campaigns need to be intensified to sensitize the general public. This may reduce disease burden and make the general public more aware about rational drug use.
- The Ministry of health should address the lack of adequate human resource by employing more health personnel in line with the hospital establishment.

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Zambia Demographic and Health Survey 2007.

ANNEXES

Annex 1. Data Collection Instruments

Annex 1A. Prescribing Indicator Form

Location: **Investigator:** **Date:**

Seq #	Type R/P	Date of Rx	Age (yrs)	# Drugs	# generics	Antibio (0/1)	Inject (0/1)	# on EDL	Diagnosis
TOTAL									
AVERAGE									
PERCENTAGE									

0 –No 1-Yes
R-Retrospective P-Prospective

Annex 1B. Facility Summary Form

Location:

Investigator: **Date:**

Essential drug list or formulary available at facility? (0/1)

Availability of key medicines recommended for treatment of some common health problems.

#(Number)	Key Indicator medicines	In stock(0/1)
1.	Amoxycillin 250mg Capsules/Tablets	
2.	Amoxycillin 125mg/5mls Suspension	
3.	Atenolol 50mg tablets	
4.	Benzathine 2.4 MU injection	
5.	Benzyl Penicillin 5MU injection	
6.	Cannulae 24G/18G	
7.	Ciprofloxacin 250mg tablets	
8.	Co-trimoxazole 480mg tablets	
9.	Co-trimoxazole 240mg/5ml Suspension	
10.	4 Fixed Dose Combination (4FDC)	
11.	Tenofovir/Emitricitabine	
12.	Lignocaine 2% injection	
13.	Chlorpromazine 50/100mg	
14.	Gentamycin 40mg/ml injection	
15.	Kanamycin 1g injection	
16.	Metronidazole 200mg tablets	
17.	Salbutamol 4mg tablets	
18.	Dextrose 50% injection	
19.	Ringers lactate	
20.	Frusemide 40mg tablets	
21.	Quinine 300mg tablets	
22.	Ferrous sulphate 50mg	
23.	Arthemether/lumenfantrine tablets	
24.	Sulphadoxine/Pyrimethamine tablets	
25	Ciprofloxacin IV	

% in stock at the facility

%

Annex 1C. Facility Indicator Form.

Location:

Investigator: **Date:**

		This facility	National or WHO standard
Number of cases	Prescribing		
Average number of drugs prescribed			<2.0
Percentage of drugs prescribed by generic name			100%
Percentage of encounters with an antibiotic prescribed			<30%
Percentage of encounters with an injection prescribed			<20%
Percentage of drugs from essential drug list			100%
Availability of Essential drugs list or formulary			
Percentage of availability of key indicator drugs			

Comments:

Signature:

Annex 2. Questionnaire

Questionnaire for the Hospital Administrator on Prescribing Practices

Section A. General Information

Questionnaire #:..... Date of interview.....

Place of interview..... Telephone #.....

Section B. Number of staff by category

1. How many practising medical doctors do you have at your institution? ☐☐

2. How many clinical officers are there at your institution? ☐☐

3. How many registered nurses prescribe at your institution? ☐☐

4. Do you have any other personnel who prescribe apart from the ones mentioned above at your institution? Tick appropriate response Yes ☐ No ☐

5. If the answer is yes to question 4, how many and what are their qualifications? ☐☐
.....

6. How many pharmaceutical personnel do you have at your institution by category?

Pharmacists ☐☐

Pharmacy technicians ☐☐

Pharmacy Dispensers ☐☐

7. Do you have any personnel who dispense drugs at your institution apart from the ones mentioned above? Tick appropriate response Yes ☐ No ☐

8. If the answer is yes to question 7, how many and what are their qualifications? ..... ☐☐

9. What is the current establishment of prescribers and dispensers by category at the hospital?.....

Section C: Trainings on rational drug use

10. Has any training been done on rational drug use or good prescribing habits?

Tick where appropriate Yes ☐ No ☐

11. If the answer to question 9 is yes, how much trainings where conducted and on which dates?..... ☐☐

Thank you for your cooperation

Annex 3. Information Sheet

Dear Participant

My name is Vincent Lukali.

I am a Master of Public Health student at the University of Zambia. I am conducting a study which is assessing the rational use of drugs at Kapiri Mposhi district hospital outpatient department. The study is being conducted as a partial fulfilment of the requirement for a master's degree in public health.

The aim of this study is to gain an in-depth understanding of how drugs are rationally used at Kapiri Mposhi district hospital outpatient department so that the information generated from it can be used for program improvement and planning, not only in Kapiri Mposhi but other districts as well.

Information will be collected using a questionnaire as well as through a review of patient files.

Information that will be obtained from this study shall be submitted to UNZA, Department of public health and will be made available to Kapiri Mposhi district health management team and health policy makers in the Ministry of health. You will not be personally identified in the document that will be submitted.

The findings will be of great importance as it would help improve health service delivery through improved rational use of medicines resulting in improved patient outcomes and minimise the ever rising costs of drug budgets.

Please note that:

Voluntary Participation: Your participation in this study is voluntary. You are free to withdraw from the study at any time if you wish to do so without any consequences on your rights as a participant.

Risks and discomforts: There are no obvious risks or discomforts involved in taking part in this study. However, if you feel uncomfortable answering some of the questions, you are free not to answer.

Benefits: There are no monetary benefits that will be given in exchange for information obtained. However, taking part in this study will generate information that will contribute to the provision of quality health services to patients thereby helping in reducing mortality and morbidity.

Confidentiality: The information that you will give shall be handled with the utmost confidentiality. You are not required to write your name or initials on the questionnaire to give identity.

Clarification: Should you need any clarifications do not hesitate to contact the researcher on the contacts that have been given below.

Mr Vincent Lukali
University of Zambia, School of Medicine
Department of Public Health,
P.O Box 50110, Lusaka.
E-mail: lukalivincent@yahoo.com
Mobile: +260-977466202

You can also get in touch with the Biomedical Research Ethics Committee at UNZA on:

The Biomedical Research Ethics Committee
University of Zambia
Box 50110, Lusaka.
E-Mail: unzarec@unza.zm
Telephone: +260-211-256067; Fax: +260-211-250753.

Annex 4. Ghantt Chart.

			2011							2012			
No	**Task to be performed**	**Responsible person**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
1	Literature review	Researcher	→	→									
2	Proposal development	Researcher	→	→	→								
3	Presentation to graduate forum	Researcher		→	→	→	→						
4	Approval by UNZAREC	Researcher					→	→	→	→			
5	Data collection	Researcher								→	→	→	
6	Data analysis	Researcher								→	→	→	
7	Report writing	Researcher									→	→	
8	Submission of draft report	Researcher									→	→	
9	Submission of final report	Researcher										→	→
10	Dissemination	Researcher										→	→

Annex 5. Budget

S/N	ITEM DESCRIPTION	QUANTITY	UNIT PRICE (KWACHA)	TOTAL (ZMK)
	STATIONERY			
1	Ream of plain papers	3	35, 000	105,000
2	Pens	10	2000	20,000
3	Pencils	5	500	2,500
4	Rulers	5	5000	25,000
5	Files	5	20,000	100,000
6.	Tippex	1 packet	30,000	30,000
7.	Flash disk(USB)	1	165,000	165,000
8.	Scientific calculators	3	80,000	240,000
9.	Stapler	1	20,000	20,000
10.	Staples	1 box	15,000	15,000
11.	Perforator	1	40,000	40,000
12.	Spiral binders	4	20,000	80,000
13.	Front and back hard covers	4	12,000	48,000
	Subtotal			**890,500**
	SECRETARIAL SERVICES			
1.	Typing final report	120	3000	360,000
2.	Photocopying	360	200	72,000
3.	Binding final report	4	25,000	100,000
	Subtotal			**532,000**
	ADMINISTRATION			
1	UNZAREC fees			250,000
2	Training of research assistants	2x3 days	50,000	300,000
3.	Transport	3 data collectorsx20days	30,000	1,800,000
4.	Lunch allowances	3 x 20days	50,000	3,000,000
5.	Data entry and analysis			500,000
6.	Dissemination of results to management and study site	_	_	3.000,000
	Subtotal			**8,850,000**
	Sub grand total			10,272,500
	Contingency fund 10%			1,027,250
11	**GRAND T0TAL**			**11,299,750**

Annex 6: Letters of Approval

6.1. DHMT Approval Letter

Republic of Zambia
MINISTRY OF HEALTH
Kapiri Mposhi District Medical office

Independence Avenue
P.O Box 810093
Kapiri Mposhi-Zambia

All Communication to be addressed to
District Medical Officer

Telephone: +260 21 5 271190/1
Fax: +260 21 5 271192

Ref: KDMO/ADM/54/06/01

e-mail: kapiridhmt@yahoo.com

June 29, 2011

MPH Coordinator
UNZA
School of Medicine
LUSAKA

Dear Sir/Madam

PERMISSION FOR MPH STUDENT TO CONDUCT RESEARCH STUDY – VINCENT LUKALI

I refer to the above subject matter;

Kapiri District Medical Office has no objection to your request for Vincent Lukali MPH student conducting research at our District Hospital on Drug Use Patterns. This office will support the student in the provision of data for his research topic.

Yours faithfully

DR. MWINUNA C
DISTRICT MEDICAL OFFICER

6.2. School Approval Letter (i.e. Graduate Forum GPPF)

THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE

Telephone: 252641
Telegram: UNZA, Lusaka
Telex: UNZALU ZA 44370
Email: selestinenzala@yahoo.com

P.O. Box 50110
Lusaka, Zambia

==========

28th July, 2011

Mrs Vincent Lukali
Department of Community Medicine
School of Medicine
LUSAKA

Dear Mr Lukali,

RE: GRADUATES PROPOSAL PRESENTATION FORUM (GPPF)

Having assessed your dissertation entitled **"Drug Use Patterns at Kapiri Mposhi District Hospital".** We are satisfied that all the corrections to your research proposal have been done. The proposal meets the standard as laid down by the Board of Graduate Studies.

You can proceed and present to the Research Ethics.

Yours faithfully,

Dr. S. H. Nzala
ASSISTANT DEAN, POSTGRADUATE

CC: HOD – Community Medicine

6.3 Ethics Approval letter

THE UNIVERSITY OF ZAMBIA

BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: 260-1-256067
Telegrams: UNZA, LUSAKA
Telex: UNZALU ZA 44370
Fax: + 260-1-250753
E-mail: unzarec@unza.zm
Assurance No. FWA00000338
IRB00001131 of IORG0000774

Ridgeway Campus
P.O. Box 50110
Lusaka, Zambia

3rd February, 2012.

Your Ref: 003-09-11.

Mr. Vincent Lukali,
School of Medicine,
Department of Community Medicine,
Lusaka.

Dear Mr. Lukali,

RE: RE-SUBMITTED RESEARCH PROPOSAL: **"AN ASSESSMENT OF IRRATIONAL DRUG USE AT KAPIRI MPOSHI DISTRICT HOSPITAL OUTPATIENT DEPARTMENT"**

The above mentioned research proposal was resubmitted to the Biomedical Research Ethics Committee with recommended changes on 3rd February, 2012. The proposal is approved.

CONDITIONS:

- This approval is based strictly on your submitted proposal. Should there be need for you to modify or change the study design or methodology, you will need to seek clearance from the Research Ethics Committee.
- If you have need for further clarification please consult this office. Please note that it is mandatory that you submit a detailed progress report of your study to this Committee every six months and a final copy of your report at the end of the study.
- Any serious adverse events must be reported at once to this Committee.
- Please note that when your approval expires you may need to request for renewal. The request should be accompanied by a Progress Report (Progress Report Forms can be obtained from the Secretariat).
- **Ensure that a final copy of the results is submitted to this Committee.**

Yours sincerely,

Dr. J.C Munthali
CHAIRPERSON

Date of approval: 03 February, 2012 **Date of expiry:** 02 February, 2013