

**ASSESSMENT OF MEDICINE USE PRACTICES IN  
MBAGATHI DISTRICT HOSPITAL OUTPATIENT  
DEPARTMENT.**

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fulfillment for the award of a Master of Science degree in Public  
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**DECLARATION**

This thesis is my original work and has not been presented for a degree in any other University.

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This thesis has been submitted for examination with our approval as university supervisors.

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**JKUAT- Kenya**

## **DEDICATION**

I would like to dedicate this thesis to the members of my family especially my husband and children for understanding and supporting me during the process of my study. I am indebted to them for their support and encouragement.

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## ABBREVIATIONS AND ACRONYMS

<b>ADR</b>	Adverse Drug Reaction
<b>AMR</b>	Anti Microbial Resistance
<b>CDC</b>	Centre for Disease Control
<b>DAP</b>	Drug Action Programme
<b>EML</b>	Essential Medicine List
<b>HIVAIDS</b>	Human Immune Deficiency Virus and Acquired Immune Deficiency syndrome
<b>ICIUM</b>	International Conference on Improving Use of Medicines
<b>INRUD</b>	International Network for Rational Use of Drugs
<b>KEMRI</b>	Kenya Medical Research Institute
<b>KEMSA</b>	Kenya Medical Supplies Agency
<b>MDH</b>	Mbagathi District Hospital
<b>MRSA</b>	Methicillin Resistance <i>Staphylococcus Aureus</i>
<b>MDR-TB</b>	Multiple Drug Resistant Tuberculosis
<b>OPD</b>	Out patient Department
<b>RHZE</b>	Rifampicin Isoniazid Pyrazinamide Ethambutol
<b>STGS</b>	Standard Treatment Guidelines
<b>TB</b>	Tuberculosis
<b>USD</b>	United States Dollar
<b>WHO</b>	World Health Organization
<b>XDR-TB</b>	Extensively Drug Resistant Tuberculosis

## ABSTRACT

Irrational use of drugs is a major health problem whose consequences include ineffective treatment, unnecessary prescription, development of resistance to antimicrobials, adverse effects and economic burden to the patients. The rational use of antibacterial agents is being increasingly recognized as an important contribution to control the worldwide emergence of bacterial resistance, to minimize the side effects and to reduce the cost of the treatment. A study of prescription patterns is an important tool to determine rational drug therapy and maximize utilization of resources. Despite the grave consequences about the irrational use of medicines in public facilities, there is limited data available about the appropriate or inappropriate prescription practices in government hospitals in Kenya. The general objective of this study therefore was to assess medicine use practices by health care workers by using World Health Organization prescribing and patient care indicators in Mbagathi District Hospital outpatient department. Specific objectives were to determine the number of medicines per prescription, to determine what proportions were antibiotics, injectables, prescribed using their generic names and from the essential medicine list. The study also determined what proportion of the prescribed drugs were actually dispensed to the patient. This was a hospital based cross sectional retrospective study involving the review of prescriptions from the outpatient department from January 1<sup>st</sup> 2012 to June 30<sup>th</sup> 2012. A standard data collection tool developed by WHO was used for assessing prescribing indicators. Total number of drugs prescribed was 1,506. On average, each patient was prescribed 3.85 types of drugs. A total of 835 drugs were prescribed by generic name, accounting for 55.4% of total number of drugs prescribed (1,506). Out of 391 sampled prescriptions, 266 had antibiotics accounting for 68%. A relatively small proportion of the prescriptions (9.5%) had an injection prescribed. A total of 1,087 drugs were prescribed according to the essential medicine list (EML) accounting for 72.2%. Only 55.2% of total medicines prescribed were actually dispensed. This study revealed that prescribing practices were unacceptable as depicted by poly-pharmacy and prescription by brand names. Medicines were also not available in 44.8% of the cases. It is necessary to make prescribers aware about the appropriate use of drugs and importance of

prescribing drugs with their generic names. There is also a need for the development of prescribing guidelines and educational initiatives to encourage the rational and appropriate use of drugs as well as supervision. Procurement of approved fixed dose combinations of medicines was recommended to reduce pill burden and allocation of more funds for drug procurement. Medicine and therapeutics committees should be set up and be fully functional at both the county level and the hospital level.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **BACKGROUND**

Medicines have an important role in health care delivery and disease prevention (Ehijie and Ifeanyi, 2011). In the present days, irrational drug use is a major health problem. The irrational drug use results in various adverse consequences like ineffective treatment, unnecessary prescription of drugs, development of resistance to antibiotics, adverse drug reactions and economic burden to the patients (Haldar *et al.*, 2011). However, irrational drug use is prevalent due to irrational prescribing, dispensing and administration of the drugs. Thus, availability and affordability of quality drugs with the rational use is required for effective health care system (Ehijie and Ifeanyi, 2011). Irrational drug use is a global health problem that leads to ineffective and unsafe treatment, prolongation of illness, harm to the patients and higher cost of the drugs. The 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, at the lowest cost to them and their community (WHO, 1993).

The accidental discovery of the first antibiotic, penicillin, by Alexander Fleming in 1928 revolutionized the therapy of infection and saved millions of lives especially during the two world wars. The dramatic impact was attributable to lack of primary resistance among microbes and scarcity of antibiotics with a high cost that necessitated extraordinary prudence in their use (WHO, 1993).

Various studies have been carried out in various countries for accessing the rationality of drug prescribing. The study of the prescribing practices aims to monitor and evaluate and then recommend modifications in prescribing pattern to make the drug use rational and cost effective (Binu *et al.*, 2013). It's an important tool to promote the rational drug therapy and also to maximize the utilization of available resources (Biswas *et al.*, 2001). World Health Organization recommends a set of

drug use indicators that is useful for investigating drug use pattern in health care facilities (WHO, 1993). Various studies have been carried out to evaluate the drug use pattern in the primary health care settings using WHO prescribing indicators. However, it is also very essential to evaluate the pattern of drug use in tertiary care settings that provides complex health services. To improve the overall drug use, especially in developing countries, international agencies like World Health Organization (WHO) and the International Network for the rational use of drugs (INRUD) are carrying out studies to develop standard drug use indicators (Biswas *et al.*, 2001).

The periodic assessment of drug use pattern in a health care facility will help to identify the drug use problem and hence to promote rational drug use and assist policy makers to implement policies on drug prescribing practices in the health care facility (Teferra *et al.*, 2002). The present study was carried out with the similar aim to identify the drug use pattern and to evaluate the rationality of the prevalent prescribing practices using the various WHO prescribing indicators. Mean/Average number of drugs prescribed, percentage of drugs prescribed by generic name, percentage of prescriptions containing antibiotics, percentage of prescriptions containing injectables, percentage of drugs prescribed from the national Essential Medicine List (EML) and percentage of drugs actually dispensed (WHO,1993).

A prescription is a written, verbal or electronic order from a prescriber to a dispenser. The prescriber is not always a doctor but can also be a paramedical worker, such as a medical assistant, a midwife or nurse. The dispenser is not always a pharmacist but can be a pharmacy technician, an assistant or a nurse. Every country has its own standards for the minimum information required for a prescription and its own laws and regulations to define which drugs require a prescription and who is entitled to write it. A prescription should include date, name, address and age of the patient, name and address of the prescriber, generic name of the drug, its strength and dosage form and instructions including warnings to the patient (Meredith *et al.*,2002). In the Kenyan constitution chapter 244, the pharmacy and poisons act, all



antimicrobials and opiates are classified as prescription only drugs while analgesics and cough preparations can be sold over the counter. (Appendix 5 shows a sample prescription from the study sample).

Although the principles of rational antibiotic usage have been well defined for many years, that is, perception of need, choice of antibiotic, choice of regimen and monitoring efficacy, antibiotics are one of the most commonly prescribed drugs today. Rational use of antibiotics is extremely important as injudicious use can adversely affect the patient and cause emergence of antibiotic resistance as well as adverse drug reactions(ADR). The emergence and spread of drug resistant pathogens has already become a very serious problem internationally (Hu *et al.*, 2003).

The emerging problem of antimicrobial resistance (AMR) deserves more attention. The use of antimicrobial medicines has greatly contributed to the decline in morbidity and mortality caused by infectious diseases, but these advances in treatment are being undermined by the rapidly increasing problems of AMR. Common infectious diseases, such as tuberculosis (TB), sexually transmitted infections, acute respiratory infections, malaria, dysentery, and HIV/AIDS, are becoming increasingly difficult and expensive to treat, and the burden is greatest in developing countries where resources are limited and infection rates are high. With antimicrobial options becoming limited, physicians in developing countries may have to use older antimicrobials that have become increasingly ineffective (Howard and Scott, 2005).

In affluent nations, infections acquired in settings such as hospitals and nursing homes are a major cause of illness and death. Each year in the United States alone, some 14,000 people die from resistant infections acquired in hospitals. While antimicrobial resistance is a major concern worldwide, it is especially important for developing countries because of the high mortality associated with common bacterial infections in resource-limited settings (Apua *et al.*, 2005).

Antibiotics are the most frequently prescribed drugs among hospitalized patients. The programs which are designed to encourage appropriate antibiotic prescriptions in health care institutions are an important element in the quality of care, infection control and cost control. Available antibiotic pressure is the single most important factor for the selection of resistant bacteria and the appearance of new mechanisms of resistance but studies describing antibiotic consumption in developing countries are scarce (Ganguly *et al.*, 2011).

Quality of life can be improved by enhancing standards of medical treatment at all levels of the health care delivery system. Setting standards and assessing the quality of care through performance review should become part of everyday clinical practice. The studies on the prescribing patterns seek to monitor, evaluate and suggest modifications in the practitioners' prescribing habits, so as to make medical care rational and cost effective (Goossens, 2009).

#### **STATEMENT OF THE PROBLEM**

Irrational and inappropriate use of drugs is a major concern in both developed and developing countries. The cost of irrational use of medicines is enormous in terms of scarce resources and the adverse clinical consequences of therapies that may have real risks but no objective benefits. Irrational medicine combinations, counterfeit medicines, spurious medicines, banned lifestyle medicines and withdrawn medicines are still being prescribed by most of the trained physicians (Ghimire *et al.*, 2015).

Availability of medicines is important as far as the reduction of mortality and morbidity associated with disease burden are concerned. However, lack of essential medicines is still one of the most serious public health problems. About 30 % of the world's population lacks the medicines they need. The situation is worse in the poorest parts of Africa and Asia where the figure rises to over 50% (WHO, 1993).

Despite the grave consequences of the irrational use of medicines in public facilities, there is limited data available about the appropriate or inappropriate prescription practices such as polypharmacy and over usage of antibiotics and injections in government hospitals in Kenya. Generally there is very limited documented

information about the healthcare workers adherence to principles of rational use of medicines and medicine availability status in Mbagathi District Hospital, Nairobi County, Kenya.

### **JUSTIFICATION OF THE STUDY**

There is limited information on medicine use practices in Kenya and this study will form a basis in this topic which is of great concern worldwide. The study findings will benefit prescribers, clinicians, pharmacists/dispensers and microbiologists in their practice.

Policy makers in the hospital and Nairobi County will be provided with relevant information that could be useful in the review of drug procurement policies and implementation of policies on rational drug prescribing practices.

### **RESEARCH QUESTIONS**

- What is the average number of medicines per prescription for a patient at Mbagathi District Hospital (MDH) Out Patient Department (OPD)?
- What percentage of the medicines prescribed for a patient at MDH OPD constitute antibiotics?
- What percentage of the medicines prescribed for a patient at MDH OPD constitute injections?
- Of the medicines prescribed for a patient at MDH OPD what percentage are in their generic names?
- Of the medicines prescribed for a patient at MDH OPD what percentage are from the Essential Medicine List?
- What proportion of the prescribed medicines for a patient at MDH OPD is actually dispensed?

### **STUDY HYPOTHESIS**

Null hypothesis; there is no significant difference between the prescribing practices in Mbagathi District Hospital and the set WHO prescribing indicators.

## **1.6 GENERAL OBJECTIVE**

To assess medicine use practices by health care workers by using WHO prescribing and patient care indicators in Mbagathi District Hospital outpatient department.

## **1.7 SPECIFIC OBJECTIVES**

- To determine the average number of medicines per prescription for a patient at MDH outpatient department (OPD).
- To determine the proportion of the medicines prescribed that are antibiotics for a patient at MDH OPD.
- To determine the proportion of the medicines prescribed that are injectables for a patient at MDH OPD.
- To determine the proportion of medicines that are prescribed using generic names for a patient at MDH OPD.
- To determine the proportion of medicines that are prescribed from the essential medicine list for a patient at MDH OPD.
- To determine what proportion of the prescribed medicines is actually dispensed to a patient at MDH OPD.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 BACKGROUND

Prescription writing is a science and an art, as it conveys the message from the prescriber to the patient (Kumari *et al.*, 2008). Inappropriate drug prescribing is a global problem (Enwere *et al.*, 2007). The irrational use of drugs is a major problem of present day medical practice and its consequences include ineffective treatment, unnecessary prescription of drugs-particularly antimicrobials and injections, development of resistance to antibiotics, adverse effects and economic burden on patients and the society (Salman *et al.*, 2008). The five important criteria for rational drug use are accurate diagnosis, proper prescribing, correct dispensing, suitable packing and patient adherence (Alam *et al.*, 2006). The assessment of medicine utilization is important for clinical, educational and economic purposes. Rational prescribing forms the corner stone of successful implementation of the rational use of drugs (Nazima *et al.*, 2009). The study of prescribing patterns seeks to monitor, evaluate and if necessary, suggest modifications in prescribing patterns so as to make medical care rational and cost effective (Shankar *et al.*, 2004).

Overprescribing injections is a common type of inappropriate medicine use. The use of injections for treatment is accompanied by a variety of disadvantages including sepsis at administration site, abscesses, the risk of tissue toxicity and nerve damage from local irritation, increased risk of infection transmission including hepatitis B and HIV. Injections are also costly since they require additional expenses such as needles and syringes, thus WHO recommends that less than 10% prescriptions should include one or more injections (Mallet *et al.*, 2001).

Since antimicrobial chemotherapy was introduced in medical practice, there have been calls for its rational use. Appropriate antimicrobial treatment greatly improves the prognosis of infectious diseases. There has been a very significant reduction in morbidity and mortality associated with the use of antimicrobials since they were

first introduced (Güven and Uzun, 2003). However, the overuse of antimicrobials may increase the risks of drug resistant pathogens, side effects and costs of medical care. The right agent at the right dose and dosing interval and right duration can achieve both a favorable clinical outcome and prevent the selection of resistance. It was reported that 20–50% of antimicrobial use in humans was questionable or inappropriate (Hecker *et al.*, 2003).

The use of generic name contributes to cost reduction and provides more alternatives for drug purchases. The use of brand names also has consequences for communication between physicians. Confusion over drug terminology can result in adverse drug events. For example, a patient may inadvertently be given a second formulation of a drug because the prescribing physician failed to recognize that the patient was already taking the medication under a different name. The use of nonproprietary terminology in medicine should be encouraged to save costs, limit commercial influence, and reduce the potential for prescribing errors (Schwab *et al.*, 2002).

A combination of health-care provider education and supervision, consumer education, and an adequate medicines supply is effective in improving the use of medicines, while any of these interventions alone has limited impact. Rational use of drugs requires that patients receive the appropriate medicine, in the proper dose, for an adequate period of time, and at the lowest cost to them and their community (WHO, 1993).

## **2.2 INCORRECT USE OF MEDICINES**

World Health Organization estimates that More than 50% of all medicines are prescribed, dispensed or sold inappropriately, and half of all patients fail to take medicines correctly. The overuse, underuse or misuse of medicines harms people and wastes resources. More than 50% of all countries do not implement basic policies to promote rational use of medicines. In developing countries, less than 40% of patients in the public sector and 30% in the private sector are treated according to clinical guidelines (WHO, 1993).

Some consequences associated with incorrect use of medicines include; antimicrobial resistance, adverse drug reactions and medication errors, lost resources and hence eroded patient confidence due to poor or negative health outcomes. This incorrect use may take the form of overuse, underuse and misuse of prescription or non-prescription medicines (White *et al.*, 1999).

Incorrect use of medicines results due to lack of skills and knowledge of the prescriber in optimal diagnostic approaches and lack of independent information such as clinical guidelines. Inappropriate and unethical promotion of medicines by pharmaceutical companies whereby most prescribers get medicine information from pharmaceutical companies rather than independent sources such as clinical guidelines is yet another rampant cause of inappropriate use of drugs (Kar *et al.*, 2010). In many countries, including Kenya, Nigeria and India, drug retailers prescribe and sell medicines over-the-counter. The more they sell the more income they generate, leading to overuse of medicines, particularly the more expensive medicines. Unrestricted availability of medicines such as antibiotics leads to overuse, inappropriate self-medication and non-adherence to dosing regimens (Kar *et al.*, 2010).

Overworked health personnel leads to prescribers having too little time with each patient, which results in poor diagnosis and treatment. In such circumstances prescribers rely on prescribing habit as they do not have the time to update their knowledge of medicines. Where medicines are unaffordable, people may not purchase a full course of treatment or may not purchase the medicines at all. Instead they may seek alternatives, such as medicines of non-assured quality from the internet or other sources, or medicines prescribed to family or friends. Lack of coordinated national pharmaceutical policy including appropriate measures and infrastructure for monitoring and regulation of medicines use, training and supervision for prescribing health workers are some of the causes of incorrect use of medicines (Kar *et al.*, 2010).

A European study presented at the 14<sup>th</sup> European congress of clinical microbiology and infectious diseases held in Prague in May 2004, Kristiansson, reported that 36%

of the children reported use of antibiotics within two weeks, most frequently for acute respiratory infections and diarrhea like syndromes. In Italy only a mere 2% of antibiotic use was determined by culture and sensitivity (Kristiansson, 2004).

Although antibiotic use is rampant in medical outpatients and wards, surgeons don't lag behind. In spite of several available guidelines for the appropriate use of antimicrobials in preoperative patients, the fear of high morbidity and mortality associated with intra-abdominal infections and surgical site infections has led to misuse of antimicrobials in the preoperative period. Most commonly prescribed medicines were antibiotics 93% mostly ceftriaxone and amikacin (Salman *et al.*, 2008).

### **2.3 ANTIMICROBIAL MISUSE AND ANTIMICROBIAL RESISTANCE.**

Antimicrobial resistance is the ability of micro-organisms to resist the effects of antimicrobials. The micro-organisms change in a way that reduces or eliminates the effectiveness of drugs, chemicals or other agents designed to cure or prevent infections and/or disease caused by the micro-organism. Bacteria may be naturally resistant or insensitive to antimicrobial agents (intrinsic resistance) or may become resistant after being exposed to antimicrobial agents (acquired resistance); alternatively, a combination of both intrinsic and acquired resistance may counter the effects of antimicrobial agents (Boerlin and Reid-Smith, 2008).

The majority of strains of bacterial species can show intrinsic resistance; acquired resistance can occur through mutation, horizontal gene transfer or a combination of each. Unlike intrinsic resistance, acquired resistance is less common, existing only in some bacterial strains and species sub-populations. A bacterium can make antimicrobials ineffective by modifying or degrading parts of the antimicrobial, expelling the antimicrobial, or changing its own structure so as to reduce the antimicrobial's ability to bind or attach to the bacterium (Mulvey and Simor, 2009).

Antimicrobial resistance has a great impact on human health. Antimicrobial-resistant infections are associated with a greater risk of death, more complex illnesses, longer hospital stays and higher treatment costs (Mauldin *et al.*, 2010). The people most likely to be affected are the most vulnerable. The elderly, the very young, critical



care patients, those who are immune-compromised, those being treated with immune-suppressing drugs and those who have had antimicrobial-resistant infections before. Also at risk are those who are frequently exposed to antimicrobial-resistant pathogens (via healthcare institutions, consumption of contaminated food/water or through direct contact with infected animals (Mulvey and Simor, 2009).

Antimicrobial resistance is also an issue in hospitals, where patients are given antibiotics to fight off many types of infections. When treatment is unsuccessful, patients are able to spread the resistant strain for longer periods of time. Heavy antibiotic use can lead to the development of drug-resistant strains that may be untreatable, even by the strongest available antibiotics. In addition to being more difficult to treat, antimicrobial-resistant infections are more costly to treat. If first-line medicines are ineffective, more expensive therapies may be needed, probably for longer, with more adverse effects (Cosgrove, 2006).

In economic terms, expenditures on antimicrobials are increasing yearly. Antimicrobials

Constitute about 20 to 40 percent of a hospital's medicine budget and can lead to significant,

unnecessary health care costs if not carefully managed. Thus, antimicrobial medicines are a large and growing component of pharmaceutical expenditures in developing countries and must be managed effectively in the face of limited financial resources. The annual additional cost of treating hospital-acquired infections from just six species of antibiotic-resistant bacteria was estimated to be at least 1.3 billion dollars in 1992 and 1.87 billion dollars in 2006 (CDC, 2006).

Costs associated with AMR among outpatients in the United States have been estimated to lie between USD 400 million and USD 18.6 billion, and corresponding inpatient costs are likely to be several times higher (Okeke *et al.*, 2005). Little published evidence exists on the economic burden of resistance in developing countries notably Kenya. A single resistant organism, MDR-TB, serves to illustrate the enormity of the problem in resource constrained countries. The cost of a full course of drug treatment for MDR-TB in the northwest province of South Africa is

USD 4,300 compared with USD 35 for drug-susceptible TB (Singh *et al.*,2007). Data from Peru support the hypothesis that MDR-TB is much more expensive to treat than susceptible tuberculosis strains that are resistant to only one or two medicines—costs were estimated at USD 8,000 and USD 267, respectively (Okeke *et al.*, 2005).

Drug resistance has emerged across the spectrum of microbes: viruses, fungi, parasites, and

bacteria. Of 8,987 observed cases of invasive methicillin-resistant *Staphylococcus aureus* (MRSA) reported in a study between July 2004 and December 2005, 58 percent were health care associated and 27 percent were hospital-onset associated. The increasing incidence of this resistant organism in both hospitals and the community is indicative of the emerging anti-microbial resistance (AMR) crisis (Klebens, 2007).

Contributing to the accelerating surge of drug resistance is multidrug-resistant tuberculosis

(MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB). When resistance develops to two or more antimicrobials, the result is multidrug resistance. In early 2006, an XDR-TB strain killed 52 of 53 individuals with identified cases in South Africa. Extensively drug resistant TB has since been identified in all regions of the world including United States of America, Nigeria, Pakistan, Turkey and Kenya (Singh *et al.*, 2007).

In western Kenya, where a high percentage of diarrhea is caused by bacteria, more than half of all pathogens examined are not susceptible to empirical antimicrobial therapy, and 74 percent of isolates are multidrug resistant to three or more agents. Resistance of *Shigella* to ampicillin, tetracycline, co-trimoxazole, and chloramphenicol is widespread in Africa, even through these medicines are still used for first-line chemotherapy for dysentery in many parts of the continent. The introduction of nalidixic acid has been followed by emergence of *Shigella* resistance (Okeke *et al.*, 2005).

Multidrug-resistant *S. enterica* serotype paratyphi (*S. paratyphi*) infections have been associated with an increase in the reported severity of disease and emerged as a major public health problem in Asia. Widespread resistance of *N. gonorrhoea* has necessitated the replacement of penicillin and tetracycline with more expensive first-line medicines, to which resistance quickly emerged. In the Caribbean and South America, azithromycin resistance was found in 16 to 72 percent of isolates in different locations, resulting in the recommendation that this medicine in turn is replaced by ceftriaxone, spectinomycin, or the quinolones. The high cost of other options, however, such as third-generation cephalosporins makes their use prohibitive in many developing countries (Gelder *et al.*, 2006).

On a global scale resistance to penicillin treatment was estimated to be between 5% and 98 % for gonorrhoea and between 12% and 55% for pneumonia and bacterial meningitis. Antibacterial resistance is becoming increasingly common in cholera infections in developing countries. Up to 90 percent of *Vibrio cholerae* isolates are resistant to at least one antimicrobial. Overuse of chloroquine for the treatment of malaria led to widespread resistance which is now established in 81 of the 92 countries where the disease is endemic substantially raising the costs of treatment with second and third line antimalarial medicines (Tapsall, 2001).

The emergence and spread of *S. dysenteriae* type I resistant to co-trimoxazole, ampicillin, tetracycline, chloramphenicol, and increasingly nalidixic acid in the past two decades means that these inexpensive and widely available antimicrobials can no longer be used empirically. Penicillin and erythromycin resistance is an emerging problem in community-acquired

*S. pneumoniae* in Asia, Mexico, Argentina, and Brazil as well as in parts of Kenya and Uganda (Okeke *et al.*, 2005).

## **2.4 MEDICINE STOCK OUTS**

Shortages of essential medicines contribute to poor access of medicines and irrational use of what is supplied as well as increase the likelihood that expired or counterfeit drugs will enter the supply chain. Availability of medicines is important as far as

the reduction of mortality and morbidity associated with disease burden are concerned. However, lack of essential medicines is still one of the most serious public health problems. About 30 % of the world's population lacks the medicines they need. The situation is worse in the poorest parts of Africa and Asia where the figure rises to over 50 % (WHO, 1993).

As noted, only 21 percent of demand for essential medicines, including antibiotics, is currently met by Kenya Medical Supplies Agency (KEMSA) and only a portion of the medicines listed in the essential drug list. An unpredictable supply of essential drugs leads to purchases from private sector wholesalers. Noncompliant patients cite stock outs or the unavailability of drugs at public healthcare facilities as the most frequent reason for failing to take the complete dose of medicines recommended to them by a healthcare worker (Okeke *et al.*, 2005).

Patients seeking treatment in government facilities may fail to obtain a significant proportion of prescribed medicines. The potential reasons for patients failing to obtain all medicines prescribed include, non availability or unaffordability of the prescribed medicines, lack of standard treatment guidelines (STGs) and/or formulary in the facility to guide prescribing, lack of adherence to existing STGs /formulary in the procurement, prescribing and dispensing of medicines (Okeke *et al.*, 2005).

## CHAPTER THREE

### MATERIALS AND METHODS

#### 3.1 STUDY SITE

The study was conducted in Mbagathi District Hospital (MDH) situated in Langata District of Nairobi County. Mbagathi started operations in 1956 as the infectious disease wing of the Kenyatta National Hospital. In 1997 MDH became the first district hospital of Nairobi. The hospital serves diverse population, both within and outside Nairobi, with a bulk of mostly the urban poor. The county through Kenya Medical Supplies Agency (KEMSA) provides essential medicines and equipment to the hospital. Mbagathi Hospital also has outpatient (OPD) clinics including diabetes, hypertension, ophthalmology, maternal and child health, dermatological, TB, HIV, and disability assessment clinics. The hospital has also been recognized as a centre of excellence in HIV management.

#### 3.2 STUDY DESIGN:

This study was a descriptive cross-sectional survey as per WHO/INRUD drug use indicators for primary health care facilities (appendix 1). A retrospective analysis of prescriptions randomly sampled in the outpatient pharmacy during the period between January 2012 and June 2012 was done by the principal investigator. A standard data collection tool generated from WHO drug use indicators was used for assessing prescribing indicators (appendix 2). These included average number of drugs per prescription, percentage of drugs prescribed by generic name, percentage of prescriptions containing antibiotics, percentage of prescriptions containing injectable drugs, percentage of drugs prescribed from the national essential medicine list (EML) and the percentage of drugs actually dispensed to the patient.

#### 3.3 STUDY POPULATION

The prescriptions for all patients attending the outpatient department at the Mbagathi District Hospital between January 2012 and June 2012. For the six months the cumulative number of prescriptions was 37788. Refill prescriptions were thought to have same information over time hence they were excluded from the study.

### 3.3.1 Inclusion criteria

- All prescriptions of patients seen at the outpatient department at Mbagathi district hospital between 1<sup>st</sup> January 2012 and 30<sup>th</sup> June 2012.

### 3.3.2 Exclusion criteria

- Prescriptions from outside the hospital.
- Refill prescriptions.

## 3.4 SAMPLING AND SAMPLE SIZE

### 3.4.1 Sample size calculations:

The sample size required was determined using the fisher's formula for estimating the minimum sample size (Fisher *et al.*, 1993).

$$n = [z^2 (p) (1-p) / \alpha^2]$$

$$n = \frac{(1.96)^2 * 0.5(0.5)}{(0.05)^2}$$

$$(0.05)^2$$

$$n = 384 \text{ prescriptions}$$

n=minimum sample size

$\alpha^2$ =degree of precision, 5% will be used

z=is the standard normal deviate that corresponds to 95% confidence interval

p=proposed percentage of antimicrobial use from previous studies, 50% was used. In 2004, WHO reported the figure for unwarranted antibiotics prescriptions at roughly 50% globally (WHO, 2004).

The minimum sample size was determined as 384 prescriptions. To allow for non completeness and illegibility of the prescriptions the minimum sample size was adjusted by 5% to 403 prescriptions.

### **3.4.2 Sampling procedure**

Selection of prescriptions was done by the principal investigator. A systematic random sampling procedure was adopted beginning January 2012 to June 2012. The sampling frame was defined as 37788, cumulative total number of prescriptions for the six months. Since the minimum sample size had been adjusted to 403, the sampling fraction therefore was determined as  $(N/n) 37788/403=94$ . The first prescription from the month of January was randomly generated using random number tables between the first 94 prescriptions. The 21<sup>st</sup> prescription was randomly selected and thereafter every 94<sup>th</sup> prescription was subsequently picked until the entire sample size (403) was attained.

### **3.5 DATA COLLECTION**

Data was collected using a schedule to gather information, (appendix 2), from the prescriptions. The following variables were studied according to WHO drug use evaluation indicators for outpatients (appendix 1). A duly filled schedule is shown as (appendix 6).

- Average number of medicines per prescription.
- Number of medicines prescribed in generics name.
- Number of prescriptions with antibiotics.
- Number of prescriptions with injections.
- Number of medicines prescribed from Essential Medicine List (EML).
- Number of drugs actually dispensed.

### **3.6 DATA MANAGEMENT AND ANALYSIS**

#### **3.6.1 Data management**

Data was coded. Categorical data such as use of antibiotics was coded as (YES=1) for antibiotic use and (NO=0) where antibiotics were not used. This was also done for use of injectables. It was checked for completeness and Consistency then entered into a dataset .Validation checks were carried out to ensure that the entered data reflected what was recorded in the patient's prescriptions. At the end of the exercise back up electronic copies were created for storage and for analysis purposes.

### **3.6.2 Data analysis**

Data analysis statistical package for social sciences (SPSS) computer software version 20.0 was used. Descriptive statistics including means, medians, and standard deviations, was used to describe the results. Inferential statistics, two sample t test were used to compare study means and percents with the WHO values. Different prescribing indicators were computed as adopted from the WHO manual for prescribing indicators assessment.

(a) Average number of drugs per encounter = Total number of drugs prescribed / Total number of prescriptions sampled.

(b) Percentage of drugs prescribed by generic name = (Number of drugs prescribed by generic name / Total number of drugs prescribed) × 100.

(c) Percentage of encounters with an antibiotic prescribed = (Number of patient encounters with an antibiotic / Total number of prescriptions sampled) × 100.

(d) Percentage of encounters with an injection prescribed = (Number of patient encounters with an injection prescribed / Total number of prescriptions sampled) × 100

(e) Percentage of drugs prescribed from essential medicine list = (Number of drugs prescribed from essential medicine list / Total number of prescribed drugs) × 100.

(f) Percentage of drugs actually dispensed = (number of drugs actually dispensed at the health facility / total number of drugs prescribed) × 100.

### **3.7 ETHICAL CONSIDERATIONS**

This was a retrospective study of a registry type. Secondary data was used hence no risks were anticipated in terms of physical or psychological harm. Privacy and confidentiality was maintained throughout the study by ensuring identifiable information was replaced by a serial number. No names were used. Only one computer was used to collect data. Information was password protected hence only accessed by the principal investigator.



Permission to use the hospital records (prescriptions) was sought in writing from the institution , Mbagathi Hospital, through the Research Committee, (appendix 3). Study was only conducted after approval from the (Kenya Medical Research Institute) KEMRI Ethical Review Committee, (appendix 4). The study did not involve any invasive procedures on the patient and consequently no consent forms were required.

### **3.8 LIMITATIONS OF THIS STUDY**

1. There was reliance on record keeping of others. Important data may not have been available in some cases. For example this study would have wished to relate prescriptions versus diagnosis as well as the cadre of the prescriber but this information was missing in most of the prescriptions.
2. This was a single centre study hence the results may not be generalizable to other facilities, but will best serve to generate hypothesis.
3. Adherence to medicines is one of the most important aspects of health care but due to the nature of this study, this was not accounted for.
4. The study used the World Health Organization prescribing indicators, which are supposed to record exactly what is prescribed to patients, but not why. In order to explain why, other techniques are needed.

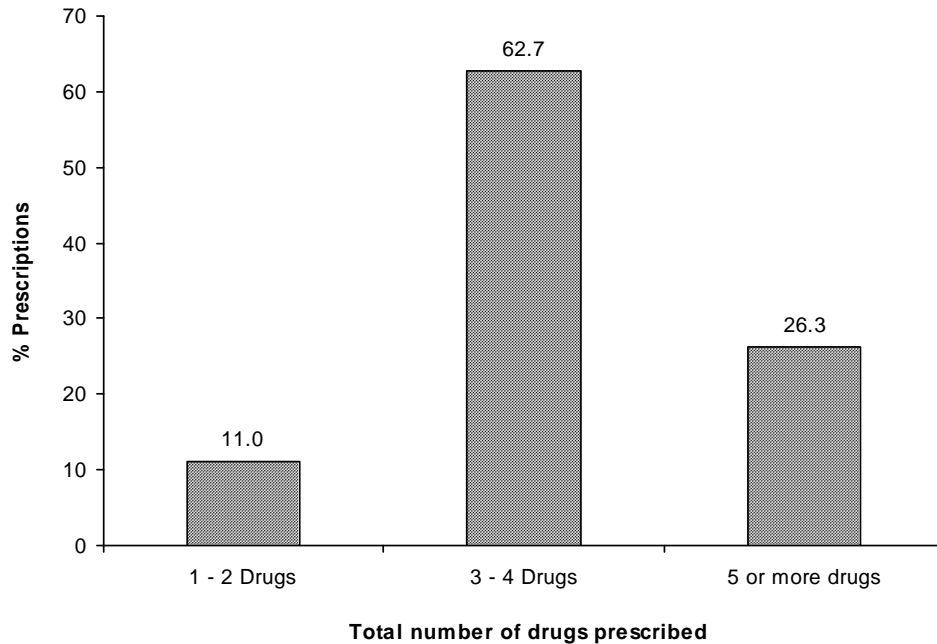
## CHAPTER FOUR

### RESULTS

Out of the 403 prescriptions selected for the study, twelve were not legible hence the information could not be extracted and were therefore dropped. This left a total of 391 prescriptions which were used for this study.

#### 4.1 AVERAGE NUMBER OF DRUGS PRESCRIBED PER PRESCRIPTION

Total number of drugs prescribed was 1,506. On average, each patient was prescribed 3.8 types of drugs. Only 11%, which is approximately 43 of the prescriptions, had 2 or less drugs prescribed which is in line with WHO recommendation. 26.3% of the prescriptions had 5 or more drugs prescribed (Figure 4.1).



**Figure 4.1 Total number of drugs prescribed**

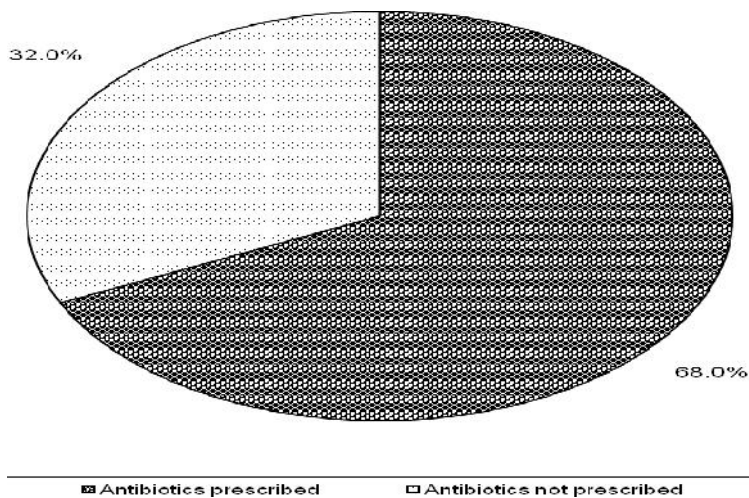
The three most commonly class of drugs prescribed at the outpatient were analgesics (23.5%), antibiotics (22.7%), and vitamins and minerals (12%) respectively.

**Table 4.1 Distribution of the 1506 drugs prescribed**

Class	No of agents prescribed	Percentage consumption
Antibiotics	342	22.7
Anti malarials	23	1.5
Anti virals	35	2.3
Antifungals	11	0.7
Cardiovascular drugs	101	6.7
Analgesics	354	23.5
Hypnotics, sedatives	39	2.6
Anticonvulsants	25	1.7
Corticosteroids	91	6
Antidiabetics	150	10
Vitamins and minerals	180	12
Antiallergic and antianaphylactic agents	65	4.3
Drugs acting on respiratory system	50	3.3
Drugs acting on gastrointestinal system	40	2.7
<b>Total</b>	<b>1506</b>	<b>100</b>

**4.2 PROPORTION OF PRESCRIPTIONS WITH ANTIBIOTICS PRESCRIBED**

Majority of the prescriptions (68. %) had at least 1 drug being an antibiotic. One hundred and twenty five prescriptions (32.0%) had no antibiotics prescribed (Figure 4.2).



**Figure 4.2 : Percentage of prescriptions with an antibiotic prescribed**

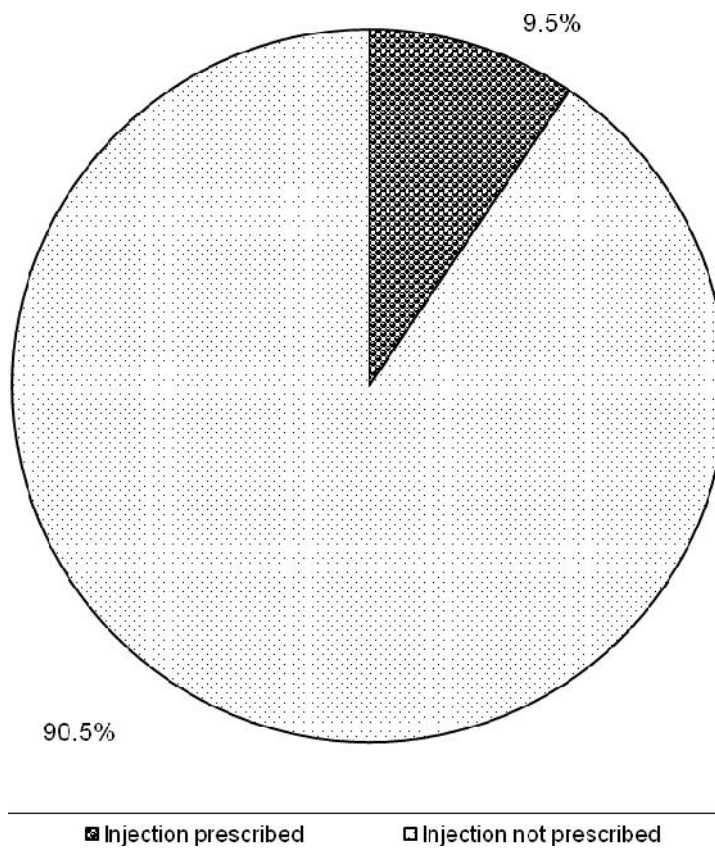
The total number of antibiotics prescribed was 342. This constituted 5 injectables and 337 oral antibiotics. The top five antibiotics prescribed were Amoxicillin 17%, Metronidazole 12.6%, Amoxicillin clavulanic acid 12%, Co-trimoxazole 10.5% and Flucloxacillin 9.1% in that order. The most prescribed class of antibiotics was Penicillins at 39% .

**Table 4.2: Distribution of antibiotics prescribed**

<b>Class of antibacterial</b>	<b>Antibacterial drugs</b>	<b>No.of drugs prescribed</b>	<b>Percentage consumption Per drug</b>	<b>Percentage consumption per class</b>
Penicillins	Amoxicillin	58	17	<b>39</b>
	Amoxillin /clavulanic acid	42	12	
	Benzathine penicillin	3	0.9	
	Flucloxacillin	31	9.1	
Cephalosporins	Ceftriaxone	2	0.6	<b>7.9</b>
	Cefadroxil	11	3.2	
	Cefixime	9	2.6	
	Cefuroxime	5	1.5	
Lincosamides	Clindamycin	3	0.9	<b>0.9</b>
Macrolides	Azithromycin	11	3.2	<b>6.1</b>
	Erythromycin	10	2.9	
Tetracyclines	Doxycycline	9	2.6	<b>3.8</b>
	Tetracycline	4	1.2	
Antituberculous drugs	RHZE(Rifampicin, Isoniazid,Pyrazinamide,Ethambutol)	8	2.3	<b>3.2</b>
	Isoniazid	3	0.9	
Antiamoebics	Aminosidine	11	3.2	<b>15.8</b>
	Metronidazole	43	12.6	
Fluoroquinolones	Ciprofloxacin	20	5.8	<b>11.4</b>
	Norfloxacin	13	3.8	
	Nalidixic acid	6	1.8	
Aminoglycosides	Gentamicin	4	1.2	<b>1.2</b>
Sulphonamides	Co-trimoxazole	36	10.5	<b>10.5</b>
	Total	342	100%	<b>100%</b>

### 4.3 PROPORTION OF PRESCRIPTIONS WITH INJECTABLES PRESCRIBED

A relatively small proportion of the prescriptions (9.5%) had an injection prescribed. The most commonly prescribed injectables were analgesics (figure 4.3).



**Figure 4.3: Percentage of prescriptions that had an injectable prescribed.**

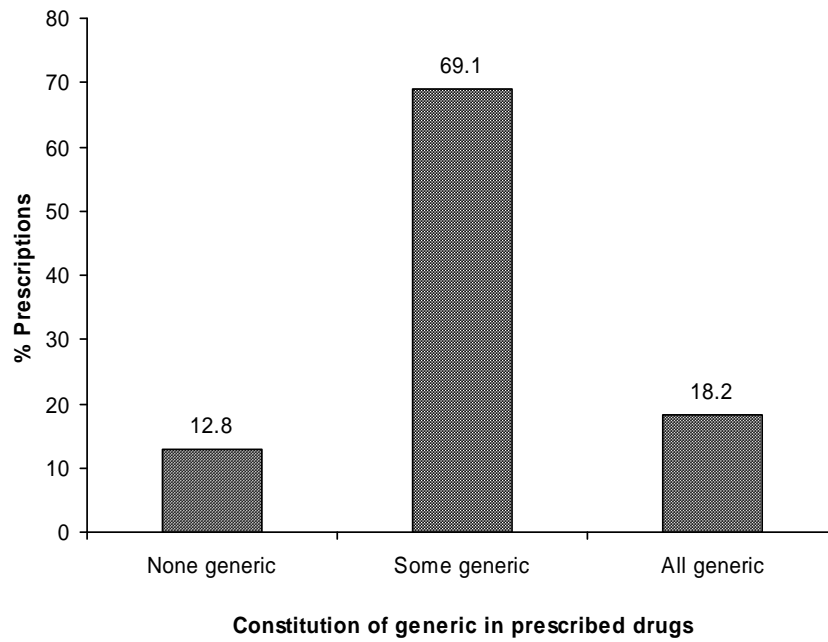
A total of 38 injectable drugs were prescribed. The leading five agents prescribed were diclofenac 18.4%, hydrocortisone 13.2%, paracetamol 10.5%, benzathine penicillin 7.9% and insulin 7.9%. The leading injectables prescribed at the outpatient were analgesics.

Table 4.3 : Distribution of the injectable drugs prescribed.

<b>Class of injectable prescribed</b>	<b>Drug prescribed</b>	<b>No. of drugs prescribed</b>	<b>Percentage consumption per drug</b>	<b>Percentage consumption per class</b>
Antibiotics	Ceftriaxone	2	5.3	<b>13.2</b>
	Benzathine penicillin	3	7.9	
Analgesics	Diclofenac	7	18.4	<b>28.9</b>
	Paracetamol	4	10.5	
Anticovulsants	phenytoin	1	2.6	<b>10.5</b>
	diazepam	2	5.3	
	Phenobarbitone	1	2.6	
Antiallergics/antianaphylactics	Chlorpheniramine	1	2.6	<b>18.4</b>
	Hydrocortisone	5	13.2	
	Dexamethasone	1	2.6	
Drugs acting on gastrointestinal system	Ranitidine	2	5.3	<b>10.6</b>
	Hyoscine butylbromide	2	5.3	
Vaccines and immunoglobulins	Tetanus toxoid	2	5.3	<b>10.6</b>
	Antirabies vaccine	2	5.3	
Antidiabetics	Insulin	3	7.9	<b>7.9</b>
	<b>Total</b>	<b>38</b>	<b>100%</b>	<b>100%</b>

#### **PROPORTION OF PRESCRIPTIONS WITH DRUGS PRESCRIBED USING THEIR GENERIC NAME**

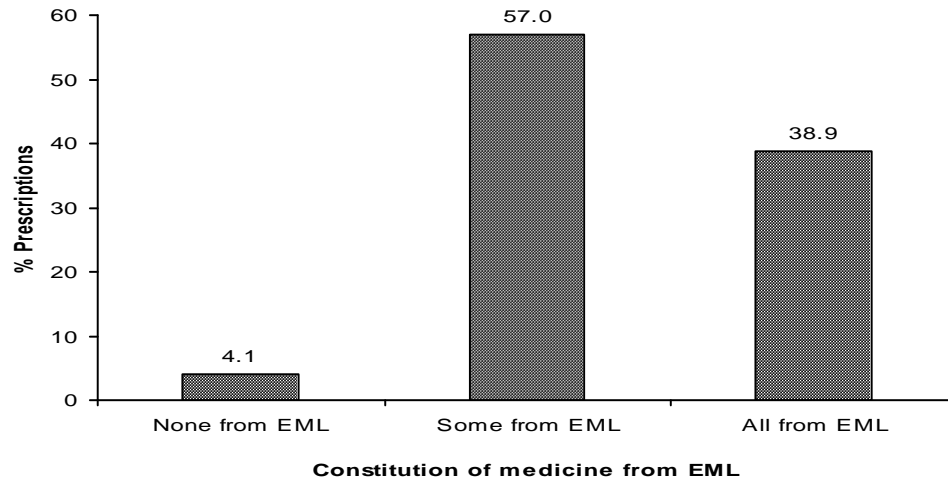
Out of all the prescriptions, 18.2% had all the drugs prescribed bearing a generic name. Fifty prescriptions (12.8%) had none of the drugs bearing a generic name (figure 4.4).



**Figure 4.4: Constitution of drugs prescribed using their generic name.**

#### **4.5 PROPORTION OF MEDICINES PRESCRIBED FROM ESSENTIAL MEDICINE LIST**

38.9% of all the prescriptions had all the drugs prescribed being listed in Essential Medicine List. Sixteen prescriptions (4.1%) had none of the drugs prescribed listed in Essential Medicine List (figure 4.5).

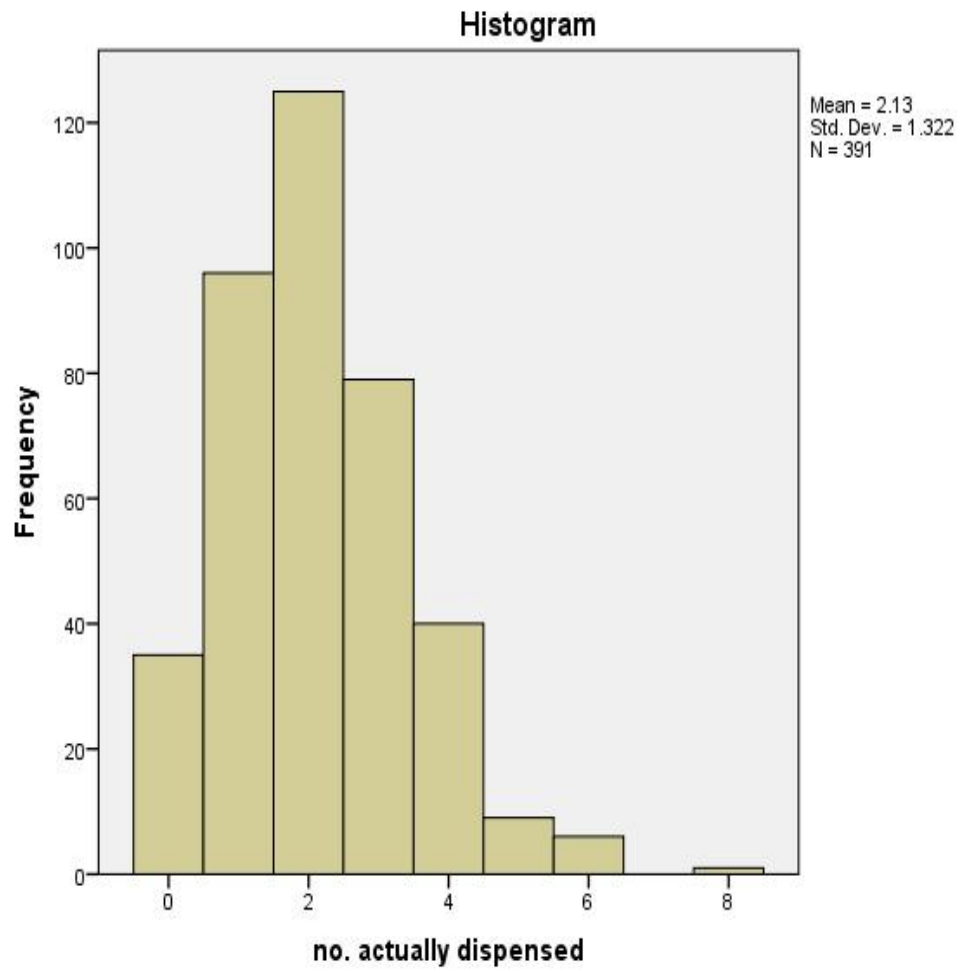


**Figure 4.5: Constitution of medicines prescribed from the essential medicine list (EML).**

#### **4.6 PROPORTION OF PRESCRIBED MEDICINES ACTUALLY DISPENSED TO THE PATIENT**

Thirty five prescriptions (9.0%) had none of the drugs prescribed available for dispensing. The average number of drugs dispensed was 2 (figure 4.6).





**Figure 4.6: Number of drugs actually dispensed.**

**4.7 SUMMARY OF RESULTS**

**Table 4.4: selected prescribing variables among the sampled prescriptions**

<b>Variables</b>	<b>n=391</b>	<b>%</b>
<b>Total number of drugs prescribed</b>		
1 - 2 Drugs	43	11.0
3 - 4 Drugs	245	62.7
5 or more drugs	103	26.3
<b>Total</b>	<b>391</b>	<b>100</b>
<b>Number of drugs prescribed in generic name</b>		
Nil	50	12.8
1 - 2 Drugs	202	51.7
3 - 4 Drugs	108	27.6
5 or more drugs	31	7.9
<b>Total</b>	<b>391</b>	<b>100</b>
<b>Number of drugs prescribed from Essential Medicine List</b>		
Nil	16	4.1
1 - 2 Drugs	149	38.1
3 - 4 Drugs	192	49.1
5 or more drugs	34	8.7
<b>Total</b>	<b>391</b>	<b>100</b>
<b>Number of drugs actually dispensed</b>		
Nil	35	9.0
1 - 2 Drugs	221	56.5
3 - 4 Drugs	119	30.4
5 or more drugs	16	4.1
<b>Total</b>	<b>391</b>	<b>100</b>
<b>Prescriptions with antibiotics prescribed</b>		
Yes	266	68.0
No	125	32.0
<b>Total</b>	<b>391</b>	<b>100</b>
<b>Prescriptions with injectables prescribed</b>		
Yes	37	9.5
No	354	90.5
<b>Total</b>	<b>391</b>	<b>100</b>

**Table 4.5: Summary of values obtained for the indicators studied.**

<b>Indicator (n=391)</b>	<b>calculations</b>	<b>Value obtained</b>
<b>Prescribing indicators</b>		
Average number of drugs per encounter	1506/391	3.85
Percentage of drugs prescribed by generic name	(835/1506) *100	55.4%
Percentage of encounters with an antibiotic prescribed	(266/391)* 100	68.0%
Percentage of encounters with an injection prescribed	(37/391)*1 00	9.5%
Percentage of drugs prescribed from essential drugs list	(1087/150 6)*100	72.2%
Patient care indicators		
Percentage of drugs actually dispensed	(832/1506)* 100	55.2%

The values obtained from the study were compared with the WHO standard set values using a two sample student t test. The average number of drugs in the study was 3.85 and ideal is set as two or less. The difference between these two means were found to be statistically significant with a p value of less than 0.001. The only indicator which was within the WHO value was percentage of prescriptions with an injection prescribed, 9.5%. The WHO set value is 10% or less. The difference in percentages was not statistically significant with a p value of 0.814 .

**Table 4.6: Comparison of prescribing practices at Mbagathi District Hospital with WHO set values.**

<b>S.no</b>	<b>Indicator(n=391)</b>	<b>Value obtained in the Study</b>	<b>WHO set value</b>	<b>Test statistic</b>	<b>P value</b>
<b>1.</b>	Average number of medicines per prescription	<b>3.854(±1.0 SD)</b>	2.0 (±1.0 SD)	<b>27.964</b>	<b>&lt;0.001</b>
<b>2.</b>	Percentage of drugs prescribed by generic name	<b>55.4%</b>	<b>100%</b>	<b>14.981</b>	<b>&lt;0.001</b>
<b>3.</b>	Percentage of prescriptions with an antibiotic prescribed	<b>68%</b>	<b>30%</b>	<b>10.656</b>	<b>&lt;0.001</b>
<b>4.</b>	Percentage of prescriptions with an injection prescribed	<b>9.5%</b>	<b>10%</b>	<b>0.236</b>	<b>0.814</b>
<b>5.</b>	Percentage of drugs prescribed from Essential medicine List	<b>72.2%</b>	<b>100%</b>	<b>11.236</b>	<b>&lt;0.001</b>
<b>6.</b>	Percentage of drugs actually dispensed	<b>55.2%</b>	<b>100%</b>	<b>15.024</b>	<b>&lt;0.001</b>

## CHAPTER FIVE.

### DISCUSSION, CONCLUSION AND RECOMMENDATIONS

#### 5.1DISCUSSION

With regard to the average number of drugs per prescription, the value found in the present study was 3.85. A staggering 56.75% of prescriptions had 4 or more drugs suggesting a trend of polypharmacy. The three leading types of drugs prescribed at the outpatient were analgesics, antibiotics and vitamins and minerals respectively.

A study conducted in Jordan gave average number of drugs prescribed as, 2.3, (Otoom *et al.*, 2002), Brazil, 2.4 (Acurcio *et al.*,2004) and India 2.7 (Mhetre *et al.*, 2003). In other studies conducted, the highest and lowest values found were 3.8 in Nigeria and 1.3 in Ecuador (Hogerzeil *et al.*,1993) respectively. The study results are comparable to that in Nigeria which is quite high.

The variation in results may be due to differences in characteristics of health care delivery system, socioeconomic profile, and morbidity and mortality characteristics in the population. Lack of skills and knowledge of prescribers, unethical promotion of drugs and treatment based on symptoms rather than the diagnosis are also probable reasons of polypharmacy. In addition, empirical treatment is also a problem, where two or more drugs are prescribed but one specific drug is enough after proper diagnosis (WHO,2004)

World Health Organization has stated that average number of drug per prescription should be 2.0 or less (Sharif *et al.*, 2007). It was observed the prescriptions with many medicines up to eight were for chronic clinical conditions like hypertension and diabetes. There was a total of 101 anti-hypertensive drugs prescribed and 150 anti-diabetic drugs prescribed. This constituted 16.7% of the total medicines prescribed. In such cases the patients can require more drugs than as stated by WHO and polypharmacy can be acceptable (Chobanian *et al.*, 2003).

In the present study the encounters with antibiotic prescription was 68%. The top three classes of antibiotics prescribed were penicillins 39%, antiamoebics 15.8% and fluoroquinolones 11.4%. Ceftriaxone and benzathine penicillin were the mostly

prescribed injectable antibiotics. The antibiotic prescription reported in Iran was (61.9%), (Moghadamnia *et al.*, 2002). England (60.7%) and Norway (48%) respectively, (Sharif *et al.*, 2007). According to WHO, 15-25% of antibiotics encountered is expectable in the countries where an infectious disease including African trypanosomiasis, cholera, Hepatitis A, B and C, HIV/AIDS, malaria, measles, tuberculosis among others is more prevalent (WHO, 1993). In the drug use pattern study in developing countries, the percentage of encounters in which an antibiotic was prescribed was high in Sudan (63%), Uganda (56%), and Nigeria (48%) and relatively better in Zimbabwe (29%) (Hogerzeil *et al.*, 1993).

In Kenya, a study of diarrheal pathogens, including Shigella, Campylobacter, Vibrio cholerae and Salmonella found that of the cases of diarrhea that were given antibiotic treatment, 51% had pathogens that were not susceptible to the antibiotic given. Although this may reveal the extent of inappropriate prescribing, it also demonstrated the extent of resistance across species to antibiotics that are commonly relied upon. The high percentage of antibiotics prescribed in our study setting may be due to cultural beliefs about antibiotics that they can cure all ailments, patient expectation to receive antibiotics, extravagant prescribing where antibiotics are prescribed for viral infections or for infections in which symptomatic treatment is enough (Shapiro *et al.*, 2001).

In this study, the percentage of prescriptions with an injection encountered was 9.5%. The three leading injectables prescribed at the outpatient were analgesics 28.9%, antiallergics/anaphylactics 18.4% and thirdly antibiotics 13.2%.

A national baseline study on drug use indicators in Ethiopia in September 2002 found the percentage of encounters with an injection to be 23% (Desta *et al.*, 2002). In a prescription pattern study in developing countries, the percentage of encounters in which an injection was prescribed was high in Uganda (48%), Sudan (36%), Zimbabwe (11%), Indonesia (17%), Ecuador (17%), and Mali (19%) (Hogerzeil *et al.*; 1993).

Minimum use of injections is preferred and this reduces the risk of infections through parenteral route and cost incurred in therapy. On this indicator the hospital was doing

well since the aim is to minimize injection use as much as possible. This was attributed to an injection reduction campaign that was underway during the period of study.

The percentage of drugs prescribed using generic name was 55.4% in this study. It is less than that reported in studies conducted in Cambodia (99.8%), (Chareonkul *et al.*,2002) India (73.4%) (Karande *et al.*, 2005). Brazil (30.6%) (Pereira *et al.*, 2004). In similar studies done in Nepal the results obtained were 63.5 % (Shankar *et al.*; 2006). The differences can be attributed to lack of skills and knowledge among the prescribers and unethical promotion of brands by medical representatives. The use of generic names is recommended by WHO and regarded as an important factor for promoting rational use of drugs (Acurcio *et al.*, 2004).

The percentage of drugs prescribed from the essential medicine list during the study period, was 72.2%, which is far from the standard (100%) derived to serve as ideal. A study in Yemen revealed (81.2%) and Egypt (94.7%) (Salman *et al.*, 2008). A national baseline study on drug use indicators in Ethiopia in September 2002 showed that the percentage of drugs prescribed from the essential medicine list was 99% (Desta *et al.*,2002). In a study of prescription patterns from developing countries, the percentage of drugs prescribed from the essential medicine list was 88% in Tanzania and 96% in Nepal (Salman *et al.*, 2008). The value in this study was low and this was attributed to lack of the essential medicine lists for use by prescribers and some were not even aware of the Essential medicine List. The World Health Organization (WHO) has advocated for the development and use of country specific Essential Medicines Lists (EML) as a strategy to promote the rational use of medicines.

Percentage of drugs actually dispensed was 55.2%. This is quite low and something needs to be done on availability of essential medicines in the hospital. An ongoing crisis of essential medicines is a big killer in Kenya. A study in Nigeria recorded 70% and Nepal 83% (Ghimire *et al.*, 2015), Cambodia 82 %, (Chareonkul *et al.*, 2002). These countries are far much better compared to Kenya and the differences

were attributed to differences in budgetary allocation to healthcare. Prioritizing healthcare is very important in achieving drug availability in hospitals.

## **5.2 CONCLUSION**

The prescribing practices in this study were not satisfactory, as suggested by polypharmacy, over prescription of antibiotics, prescribing by brand names and prescribing outside the Kenya's essential medicine list. Medicines were also not available in almost 50% of the cases and most patients were forced to look for missing medicines outside the hospital. Injection prescribing was however acceptable. There was a significant difference between the prescribing practices in Mbagathi District Hospital and the set WHO prescribing indicators therefore the null hypothesis was rejected.

## **5.3 RECOMMENDATIONS**

Any policy alone will not be effective in developing countries, and therefore the solution is a combination of education and supervision of staff who prescribe the medicines, education of patients, and adequate supply of needed drugs (Okeke *et al*, 2005). This study recommends,

### **5.3.1 At county/ policy level**

- Setting up a drugs and therapeutic committee at the county level to oversee rational drug use.
- Review and avail essential medicine lists to all facilities in the county.
- Review and avail standard treatment guidelines to the facilities.
- Ensure supportive supervision, mentorship and feedback is done to ensure rational use of medicines.
- Allocate more money for procurement of medicines on a regular basis.
- Review procurement policies at Kenya Medical Supplies Agency (KEMSA) to include approved diabetes and hypertension fixed dose combination regimens to reduce pill burden.
- The study recommends more studies across the counties both in public and private settings both on medicine use and adherence to prescribing guidelines.



- This study also recommends further work or studies on resistance on different classes of medicines across public and private facilities.

**6 At the hospital level the study recommends;**

- Sensitization targeting both medical practitioners and patients to encourage rational drug prescription and use respectively.
- Setting up a drugs and therapeutic committee at the hospital level to oversee rational drug use.
- Continuous medical education on rational use of medicines to all healthcare workers and patients.
- Formulate a hospital formulary and prescribers encouraged to prescribe from the same.
- Promote systems of supervision, audit and feedback in the hospital.
- Drug use evaluation should be done to evaluate whether the antibiotics were prescribed appropriately or not.
- More work is also needed for inpatient setting since what was done was only for outpatient setting.

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## APPENDICES

### **Appendix 1 : Selected WHO/INRUD drug use indicators for primary health care facilities (WHO, 1993)**

#### **Prescribing Indicators:**

1. Average number of medicines prescribed per patient encounter
2. % medicines prescribed by generic name
3. % encounters with an antibiotic prescribed
4. % encounters with an injection prescribed
5. % medicines prescribed from essential medicines list or formulary

#### **Patient Care Indicators:**

6. Average consultation time
7. Average dispensing time
8. % medicines actually dispensed
9. % medicines adequately labelled
10. % patients with knowledge of correct doses

#### **Facility Indicators:**

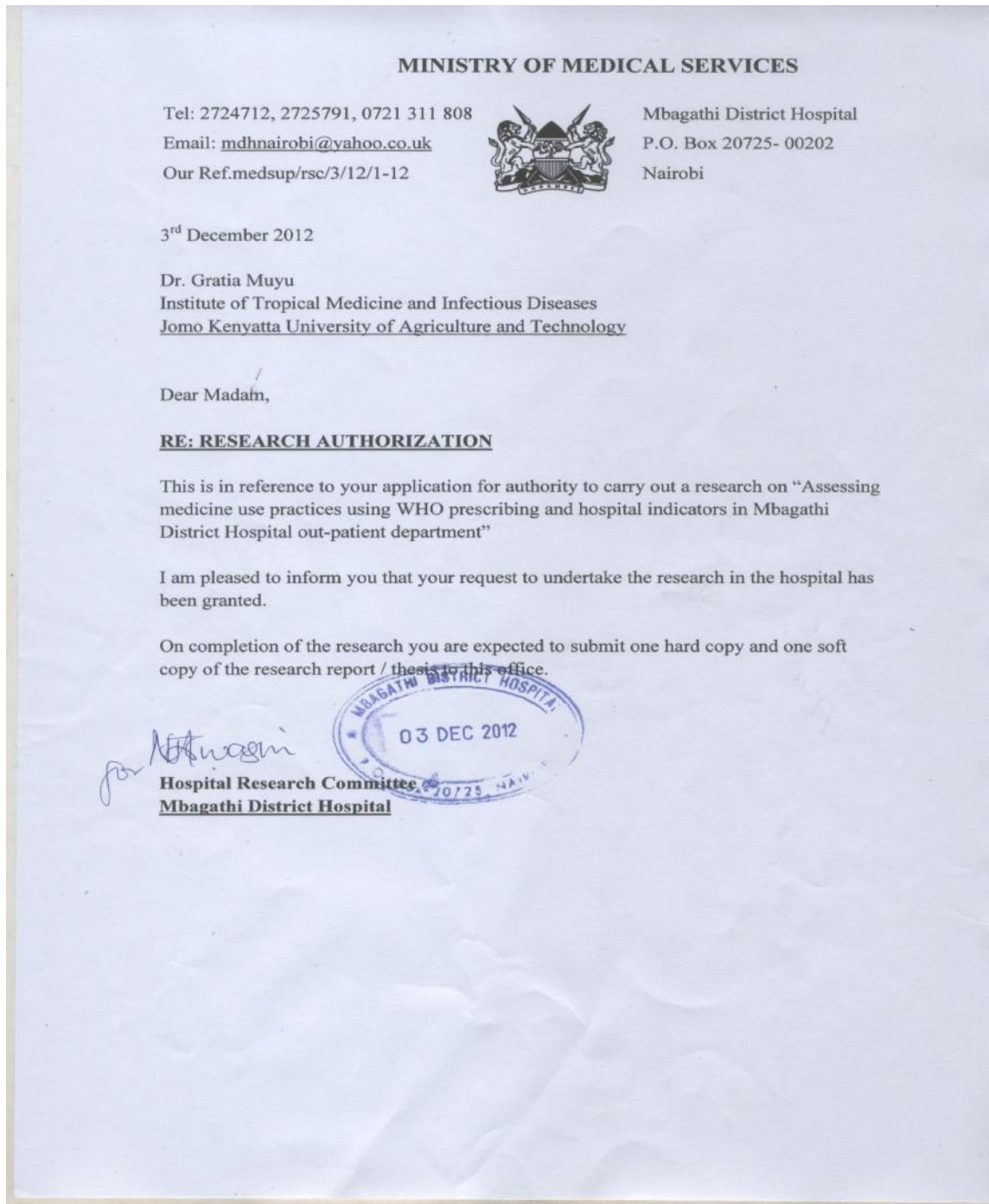
11. Availability of essential medicines list or formulary to practitioners
12. Availability of clinical guidelines
13. % key medicines available



**Appendix 2: Data collecting schedule**

<b>Sno</b>	<b>Total number of medicines Prescribed.</b>	<b>Prescriptions with an antibiotic Prescribed</b>	<b>Number of Medicines from essential medicine list.</b>	<b>No of Medicines in generic name.</b>	<b>Prescriptions with an injection prescribed</b>	<b>Number of medicines actually dispensed.</b>
1.						
2.						
3.						
4.						
5.						

**Appendix 3. Mbagathi District Hospital letter of authorization**



**Appendix 4. KEMRI Ethical Review Committee authorization**

  
27 MAY 2013

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**KENYA MEDICAL RESEARCH INSTITUTE**

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**KEMRI/RES/7/3/1** **April 23, 2013**

**TO: MUYU M. GRATIA  
PRINCIPAL INVESTIGATOR**

**THROUGH DR. YERI KOMBE  
DIRECTOR, CPHR  
NAIROBI**

**RE: SSC NO. 2524 - (REVISION): ASSESSMENT OF MEDICINE USE PRACTICES  
BY USING WORLD HEALTH ORGANIZATION'S PRESCRIBING AND PATIENT  
CARE INDICATORS IN MBAGATHI DISTRICT HOSPITAL OUTPATIENT  
DEPARTMENT.**

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This is to inform you that during the 214<sup>th</sup> meeting of the KEMRI/ERC held on 23<sup>rd</sup> April 2013, the above referenced research proposal was reviewed.

The Committee concluded that due consideration has been given to the ethical issues that may arise from the conduct of the study and granted approval for implementation effective from this day of **23<sup>rd</sup> April 2013**.

Please note that the authorization to conduct this study will automatically expire on **22<sup>nd</sup> April 2014**. If you plan to continue with the study beyond this date please submit an application for continuation approval to the ERC secretariat by **15<sup>th</sup> March 2014**.

Any unanticipated problems resulting from the implementation of this protocol should be brought to the attention of the ERC. You are also required to submit any proposed changes to this protocol to the SSC and ERC prior to initiation and advise the ERC when the study is completed or discontinued.

You may embark on the study.

Yours sincerely,

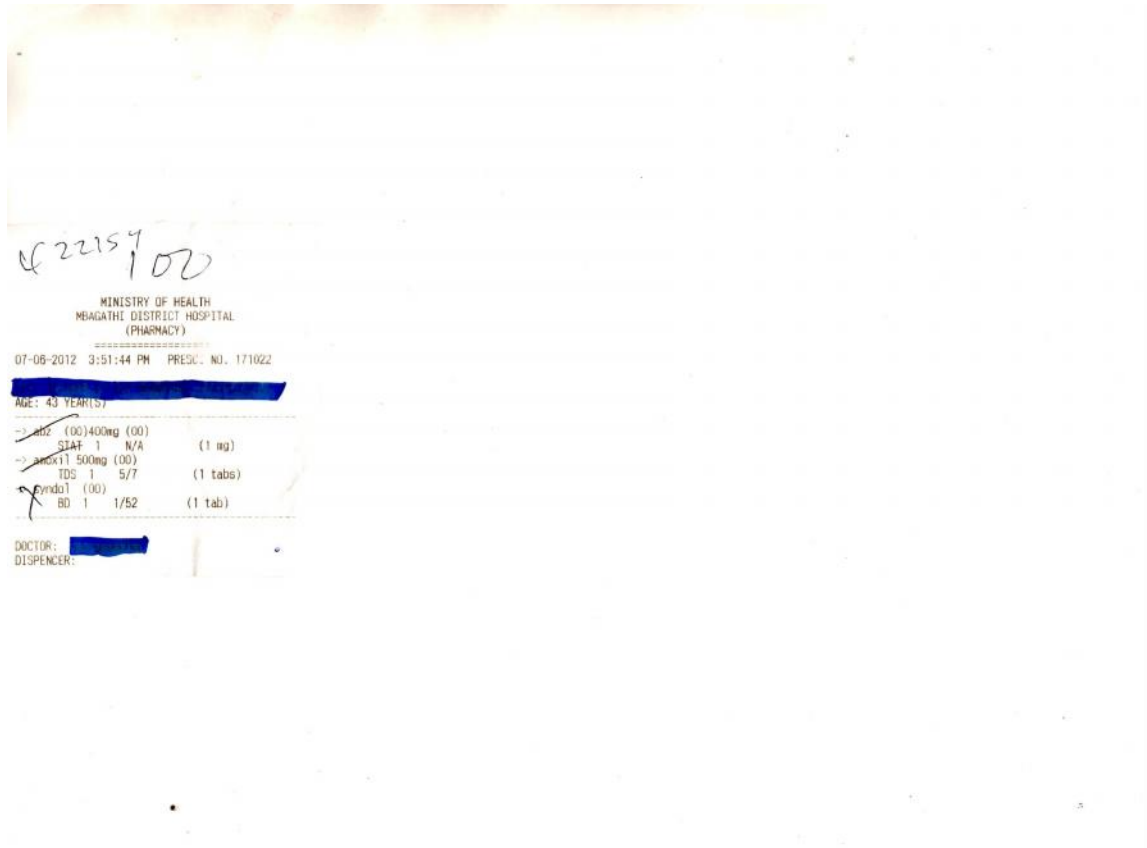


**DR. ELIZABETH BUKUSI,  
ACTING SECRETARY,  
KEMRI/ETHICS REVIEW COMMITTEE**

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In Search of Better Health

**Appendix 5. A sample prescription**



**Appendix 6: Duly filled data collecting schedule**

<b>Sn</b>	<b>Total number of medicines Prescribed.</b>	<b>Prescriptions with an antibiotic Prescribed YES=1 NO=0</b>	<b>Number of Medicines from essential medicine list.</b>	<b>No of Medicines prescribed in generic name.</b>	<b>Prescriptions with an injection prescribed YES=1 NO=0</b>	<b>Number of medicines actually dispensed.</b>
1.	4	1	3	4	0	3
2.	4	1	4	4	0	4
3.	3	1	2	1	1	1
4.	3	1	1	1	0	1
5.	5	1	2	3	0	3
6.	4	1	2	2	0	4
7.	4	0	3	1	1	2