

**A RETROSPECTIVE REVIEW OF ANTIBIOTIC UTILIZATION IN ADULT MEDICAL WARDS OF A PRIMARY CARE HOSPITAL IN ETHIOPIA**

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P.O.Box 378, Jimma, Ethiopia***Corresponding author e-mail:** segewkalh@gmail.com**ABSTRACT**

Inappropriate antibiotic use results emergence of resistance, preventable morbidity and mortality and resource wastage. Institution based retrospective cross sectional study was conducted using patient cards and prescription registration books to assess antibiotics utilization pattern in adult medical wards of Finote Selam Hospital (FSH). 30 cases per quarter were selected from the documented cards, based on Joint Commission on Accreditation of Health Organizations (JCAHO) sample size recommendation. Out of 130 cards reviewed, ceftriaxone (31.02%), amoxicillin (14.29%) and gentamicin (13.88%) were commonly prescribed. Combined antibiotics were used in 17.50% of cases and 18.77% of prescribed antibiotics were inappropriately indicated. 53.88% of prescribed antibiotics were administered through the intravenous route. Average number of antibiotics per encounter was 1.22 and 97.1% of antibiotics were prescribed with generic name. 58% of antibiotics were prescribed from Essential Drug List (EDL). Correct frequency and duration were specified in 88.16% and 42.04% of the antibiotics respectively. Duration, dosage form, route and frequency were not specified in 57.96%, 10.20%, 8.57% and 6.53% of antibiotics respectively. Not specifying dosage form, route, and duration; prescription habit deviating from EDL and improper indication were problems identified. Good generic prescription habit, low level poly-pharmacy and specifying frequency were the good practices observed.

Key words: Number of antibiotic per encounter, Improper indication, Essential drug list and Generic Prescription**INTRODUCTION**

Inappropriate use of drugs has a serious impact on national health care systems ^[1]. Proper drug utilization requires selection, prescription and dispensing of drugs on rational bases. Aggressive drug marketing promotions, lack of information on the use of drugs and drug shortages are the major cause of irrational drug use ^[2]. Regardless of considerable improvements in the availability and control of drugs in health care facilities, rational drugs use is still a problem of concern ^[3]. Bad utilization habits lead to ineffective and unsafe treatment, exacerbation or even prolongation of illness ^[4].

Antibiotics are the pillars of modern medical care and play a major role both in the prophylaxis and

treatment of infectious diseases. Issues of their availability, selection and proper use are critical aspects in the global community. Rapidly growing misuse of antibiotics has been reported to cause rapid emergence of resistance, adverse reaction, treatment failure, occurrence of preventable morbidity and mortality and wastage of resources. The additive effects of which, will increase cost of health care jeopardizing the capacity of the poor population to seek health care ^[5-7].

Inappropriate antibiotics use refers to improper administration with respect to dose and duration of treatment in light of proper clinical situations and /or financial considerations. Inappropriate use comes as a result of multiple factors; the community/consumers' misconceptions, financial strains, lack of access to unbiased drug information and Standard Treatment

Guideline (STG), high drug price, lack of emphasis on cost and adverse effects, use of antibiotics in agriculture and aquaculture^[8]. WHO reported that unwanted antibiotic prescriptions stand roughly at 50%^[9]. Percentage of prescriptions involving antibiotics range between 17.5% and 63% according to studies from different developing countries, similarly the values range between 33.1% and 64% for hospitals in Ethiopia^[3,10]. In Nigeria 60% of the antibiotics prescribed were improperly indicated; and 40% of the medication expenditure in Nepal was wasted due to inappropriate use^[11]. Furthermore studies conducted in Ethiopia indicate gaps in drug prescriptions of different hospitals^[1-3].

Retrospective Drug Utilization Review is a means for assessing use of medication against standards, which involves evaluating and re-examining of the use of drugs in order to determine the appropriateness of therapy. It addresses issues of clinical appropriateness, indications, contraindications, drug-drug interactions, dose and frequency of therapy and cost effectiveness. The delivery of health services will not be complete and adequate without conditions ensuring the safety, efficacy and quality of drugs which are indispensable for diagnosis, treatment, mitigation or prevention of diseases or symptoms^[12]. Even though there are studies conducted in Ethiopia assessing prescription patterns^[1-3, 10] and antibiotic use^[5, 13, 14], none of them focus on antibiotic use in wards of primary care hospitals which are integral parts of the health delivery system serving 250,000 population by providing curative health services. Therefore this study aims to assess the antibiotic utilization pattern in adult medical wards of FSH.

MATERIALS AND METHODS

Study area and period: This study was conducted in FSH, located in Finote Selam town 380km North West of Addis Ababa in Amhara regional state. The town has a longitude and latitude of 10°42'N 37°16'E/10.700°N 37.267°E with an elevation of 1917 meters above sea level. Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA), it has a total population of 25,913, of whom 13,035 are men and 12,878 women. The study was conducted from January 17 to January 25, 2011.

Study design: Institution based retrospective cross sectional study was conducted using patient cards and prescription registration books. All patient cards in adult medical ward recorded from Jan 1, 2010-December 31, 2011 were included in the study except those which had no drug prescriptions and/or

multiple therapies without at least one antimicrobial agent.

Sample size was determined by taking 30 cases per quarter of the documented patient cards within a year based on JCAHO sample size recommendation for antibiotics utilization studies.

Data collection and management: Pre- tested structured data collection format was used. Data was collected by final year pharmacy and nursing students who were trained on the objectives and methods of study and were provided with EDL. Systematic random sampling method was used to select samples. Data was checked for completeness and records with incomplete information were excluded from the study. List of drugs for Ethiopia was used for cross checking. After collection, data was cleaned, coded and entered into SPSS version 16; SPSS Inc, Chicago, IL, USA). Descriptive statistics was generated to meet the objective of the study.

Ethical consideration: Prior to study initiation, ethical clearance was obtained from Jimma University Ethical Board. Before data collection an official letter from Jimma University explaining the purpose of the study was submitted to the hospital administration for collaboration during data collection and support of the administration was obtained. Patient and health care provider related data was confidential and was destructed after forming database.

Prescribing indicators and operational definitions
Percentage of specific antibiotic prescribed: calculated by dividing the number of specific antibiotic prescribed by the total number of antibiotics prescribed, multiplied by 100.

Percentage of combined antibiotics per encounter: calculated by dividing the total number of combined antibiotics prescribed by the number of encounters surveyed, multiplied by 100.

Percentage of antibiotics prescribed in an injection form: calculated by dividing the number of encounters with an injection by the total number of antibiotics prescribed, multiplied by 100.

Average number of antibiotics prescribed per encounter: calculated by dividing the total number of antibiotics prescribed by the number of encounters surveyed.

Percentage of antibiotics prescribed by generic name: calculated by dividing the number of

antibiotics prescribed by generic name by total number of antibiotics prescribed, multiplied by 100.

Percentage of antibiotics prescribed from EDL: calculated by dividing number of antibiotics prescribed from the EDL by the total number of antibiotics prescribed, multiplied by 100.

Generic drugs: drugs written in their non-proprietary name.

Combination of drugs: Two or more drugs that are prescribed for a certain health condition.

Essential drugs: are drugs that satisfy the health care needs of the majority population which should be available at all times in adequate amounts and appropriate dosage forms.

Correct frequency: frequency of medication per day which is in line with the STG for a primary hospital.

Correct duration of therapy: appropriate length of therapy as per the STG for a Primary Hospitals.

Improper indication: drug indication which deviates from the STG for a Primary Hospitals for a specific diagnosis.

RESULTS

Demographic characteristics: A total of 130 adult medical inpatients cards containing 200 prescriptions were evaluated for antibiotics utilization and females accounted 58.46%. Majority (64.62%) of them were in the age group of 18-50 years; while 13.85% and 21.53% were less than 18 and greater than 50 respectively. Regarding the disease pattern, Pneumonia (29.19%), Urinary Tract Infection (14.91%) and Malaria (9.32%) were the most common causes for admission as shown in *Table 1*.

Prescribing indicators: Ceftriaxone (31.02%), Amoxicillin (14.29%) and Gentamicin (13.88%) were the most commonly prescribed antibiotics. While Norfloxacin, Chloramphenicol and Cephalexin accounted 1.22%, 1.22% and 0.83% respectively as indicated in *Table 2*.

Combined antibiotics were used in 17.50% of the cases. These combined antibiotics were used in the cases of UTI, Pneumonia and Pulmonary TB with superimposed Pneumonia. Ceftriaxone plus Gentamicin (42.86%) and Ampicillin plus Gentamicin (25.71%) were the most commonly utilized combined antibiotics where as Ceftriaxone

plus Cloxacillin (5.71%) was the least as shown in *Table 3*.

Most of the prescribed antibiotics (53.88%) were administered through injection whereas 37.00% were administered orally. The route of administration was not indicated in 8.57% of the antibiotics prescribed, depicted in *Figure 1*. Regarding dosage form, 56.33% of antibiotics prescribed were liquids and dosage form was not specified in 10.20% of the antibiotics, indicated in *Table 4*. Out of the antibiotics prescribed in liquid dosage form Ceftriaxone and Gentamicin accounted 55.00% and 24.60% respectively. 216(88.16%) and 103(42.04%) of the antibiotics were prescribed with the correct frequency of administration and duration of therapy while 13(5.31%) of them showed deviation from the recommended frequency of administration. In 16(6.53%) and 142(57.96%) of the antibiotics prescribed, frequency of administration and duration of treatment were not indicated, as illustrated in *Figure 2*. In this study 18.77% of the antibiotics were inappropriately prescribed to treat Malaria, Dyspepsia, Tetanus and Tinea captis.

The average number of antibiotics per encounter was 1.22. Prescriptions containing only one antibiotic took the lion's share (79.50%) as shown in *Figure 3*. 97.10% the antibiotics were prescribed in their generic name and none of the antibiotics were prescribed with brand name. Despite this, 2.90% of the antibiotics were prescribed using abbreviations. 58.00% of the utilized antibiotics were from the EDL of Ethiopia.

DISCUSSION

Causes of admission in this study were (UTI, pneumonia and Pulmonary TB with superimposed pneumonia which were different from the findings in Jimma University Specialized Hospital (JUSH) ^[2] which could be due to difference in geography and socioeconomic conditions.

The most commonly prescribed antibiotics in this study were Ceftriaxone (31.02%), Amoxicillin (14.29%) and Gentamicin (13.88%) whereas in Palestine, Cefuroxime (31%), Ceftriaxone (24.8%) and Ampicillin (17.2%) were the commonly utilized antibiotics ^[15]. Another study from Tehran indicated that Amoxicillin, Benzyl penicillin, Norfloxacin, Cephalexin and Cotrimoxazole were the most frequently prescribed antibiotics of which Amoxicillin was the most prevalent accounting 21.84% ^[11]. In this study combination of Ceftriaxone plus Gentamicin (42.86%) and Ampicillin plus

Gentamicin (25.71%) was higher than Palestine ^[15]. The variation observed may be due differences in disease pattern and drug availability.

Administering antibiotics using Intravenous (IV) route is appropriate only if oral antibacterial agents are not effective against a particular pathogen, bioavailability is uncertain and large doses are required which is not feasible with the oral route ^[7]. In this study 53.88% of the antibiotics were administered through IV route while 37.00% were administered orally. Use of IV antibiotics in this study was greater than hospitals in North West Ethiopia ^[3]. Most antibiotics administered (56.33%) were administered in liquid dosage form, which was higher than the findings from JUSH (16.6%) ^[1]. Ceftriaxone and Gentamicin accounted a dominant percentage of 55.00% and 24.60% respectively of the liquid dosage form administered. The large number antibiotics given IV in this study might be due to the nature of care given to patients in ward settings where injections are preferred.

The emergence of antibiotic resistance is a major challenge in the current management of infectious disease. Reasons for this being overuse and improper indication of antibiotics. 79.50%, 17.50% and 3% of the prescriptions contained one, two and three antibiotics which vary from the results in Tehran i.e. 40.64%, 7.08% and 0.72% respectively ^[11]. These variations may be due to empirical use of antibiotics as infectious diseases are prevalent in Ethiopia.

WHO estimates that about 50% of antibiotics are used for the wrong indication as antibiotics are frequently used for viral infections, parasitic infestations and non-infectious diseases. In FSH 18.77% of the antibiotics were improperly indicated which was less than JUSH (24%) ^[2], Eritrean (75%), Nigeria (60%) and Nepal (over 50%) ^[9]. Furthermore improper indications are not limited to developing countries, studies in USA show that 20% of the antibiotics prescribed are clinically useless ^[16]. This inappropriate indication of antibiotics could be results of inappropriate diagnosis and/or empiric therapy; resulting high medication expenditures (wastage of valuable resources) which can decapitate the health care system. Evidences indicated that optimal duration of antibiotic therapy is required to prevent relapse and medication associated side effects ^[7]. In this study 88.16% of the prescribed antibiotics were prescribed with the correct frequency of administration which is greater than JUSH (77%) ^[2]. But only 42.04% of the antibiotics were

prescribed in accordance to the duration stated by STG which was less compared with JUSH (53%) ^[2]. The discrepancies observed regarding frequency of administration and duration of therapy might be due to lack of antibiotics prescribing policy and standards, poor attitude and awareness of physicians about STG.

Most antibiotics (97.10%) were prescribed by generic name which is near to WHO recommendation of 100% ^[1], contrary to the findings in many developing counties that ranged from 25 to 40%. Generic prescription ensures good communication between prescribers and dispensers and provides access of drugs to patients at an affordable price.

According to WHO recommendations all drugs should be prescribed from EDL since they are made to be affordable. In this study 58% of antibiotics were prescribed from EDL of Ethiopia which was lower than Gondar University Specialized Hospital (92.2%), Bahirdar Referral Hospital (81.4%) and Debretabore Hospital (85%) ^[3]. Prescriptions deviating from national EDL increases the cost of health care to individuals and the community. The result could also indicate unavailability of essential drugs which could be due to poor procurement and stock management. In conclusion, prescribing antibiotics without specifying dosage form, route, and duration; prescription habit deviating from the EDL and improper indication were the main problems identified in the adult medical wards of FSH. Besides these problems there was a very good generic prescription habit and low level poly-pharmacy as well as good practice regarding specifying the frequency of administration. The establishment of antibiotic policy and treatment guidelines; availability of unbiased point of care reference information; involvement of clinical pharmacists; periodic antimicrobial sensitivity tests; problem targeted trainings and continuous medical education on antimicrobial chemotherapy; and availability, accessibility and affordability of first-line drugs are recommended for ensuring judicious prescribing habits and rational use of antibiotics.

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Table 1: Cause of admission in adult medical wards of FSH, Jan-Dec 2010

Cause of admission	Frequency	Percentage
Pneumonia	47	29.19
Urinary Tract Infection	24	14.91
Malaria	15	9.32
Pulmonary TB with superimposed Pneumonia	14	8.70
Hypovolumic shock	12	7.45
Acute Gastroenteritis	11	6.83
Sepsis	7	4.35
Bacterial Peritonitis	7	4.35
Peptic Ulcer Disease and Dyspepsia	6	3.73
Upper Respiratory Tract Infections	5	3.10
Others*	13	8.07

* (Pylonephritis, Tetanus, Chronic diarrhea, Trauma, etc...)

Table 2: Commonly prescribed antibiotics in the medical wards of FSH, Jan-Dec, 2010

Antibiotics	Frequency	Percentage
Ceftriaxone	76	31.02
Amoxicillin	35	14.29
Gentamicin	34	13.88
Crystalline penicillin	22	8.98
Ciprofloxacin	20	8.16
Ampicillin	15	6.12
Doxycycline	10	4.08
Cloxacillin	7	2.86
Cotrimoxazole	5	2.04
Amoxicillin- Clavulanic acid	5	2.04
Erythromycin	4	1.63
Clarithromycin	4	1.63
Others*	8	3.27

* (Norfloxacin, Chloramphenicol, Cephalexin, etc...)

Table 3: Commonly prescribed combined antibiotics in adult medical wards of FSH, Jan-Dec, 2010

Combined antibiotics	Frequency	Percentage
Ceftriaxone + Gentamicin	15	42.86
Ampicillin + Gentamicin	9	25.71
Crystalline penicillin + Gentamicin	5	14.29
Amoxicillin + Clarithromycin	4	11.43
Ceftriaxone + Cloxacillin	2	5.71

Table 4: Dosage forms of antibiotics commonly prescribed in adult medical wards of FSH, Jan-Dec, 2010

Dosage forms	Frequency	Percentage
Liquid	138	56.33
Capsules	45	18.37
Tablets	34	13.88
Suspension	3	1.22
Not mentioned	25	10.20

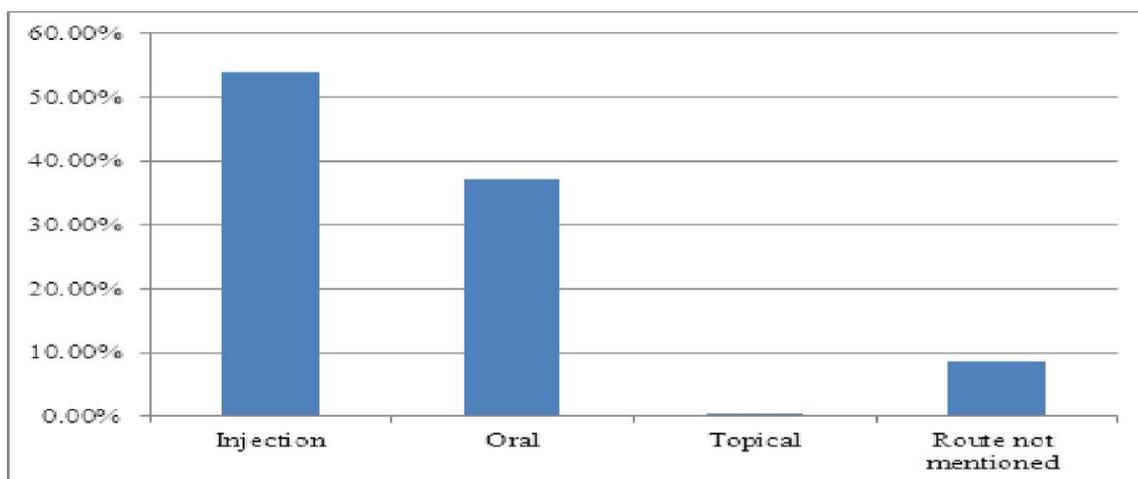


Figure 1: Route of administration for prescribed antibiotics in adult medical wards of FSH, Jan-Dec, 2010

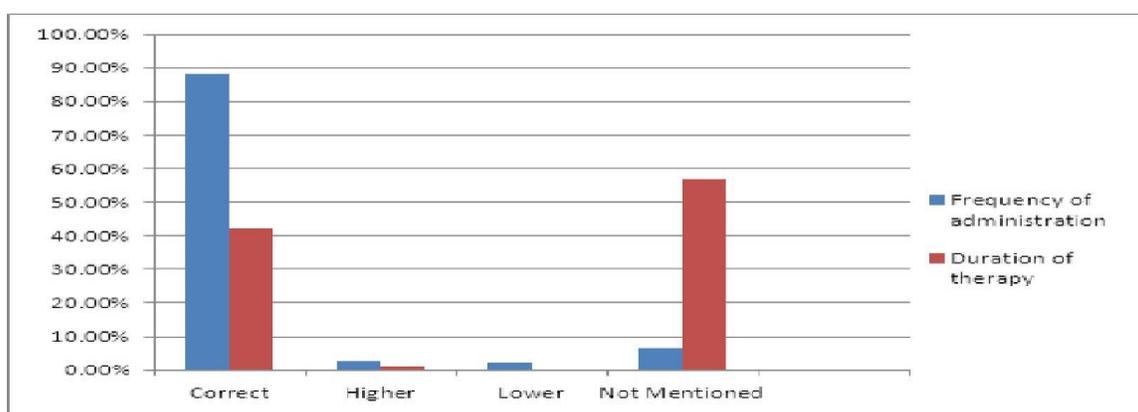


Figure 2: Frequency of administration and duration of treatment for prescribed antibiotics in adult medical wards of FSH, Jan-Dec, 2010

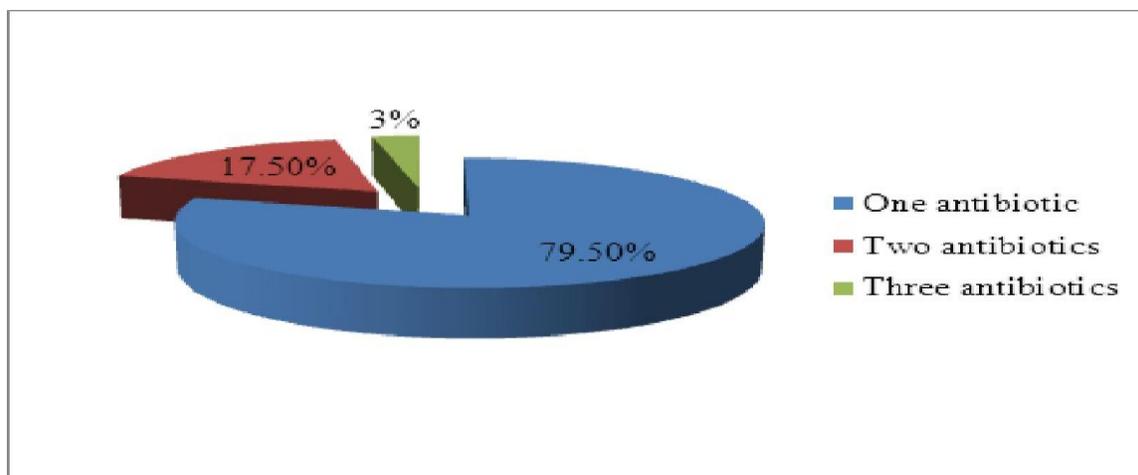


Figure 3: Number of antibiotics prescribed per encounters in the adult medical wards of FSH, Jan-Dec, 2010

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