

# EVALUATION OF DRUGS UTILIZATION PATTERN USING WHO PRESCRIBING INDICATORS IN AYDER REFERRAL HOSPITAL, NORTHERN ETHIOPIA

Birhanu Demeke <sup>1\*</sup>, Fantahun Molla <sup>2</sup>, Admassu Assen <sup>2</sup>, Wondim Melkam <sup>3</sup>, Solomon Abrha <sup>2</sup>,  
Birhanetensay Masresha <sup>3</sup>, Tigist Asefa <sup>1</sup>

<sup>1</sup>Pharmacoepidemiology and Social Pharmacy Course and Research Unit, Department of Pharmacy,  
College Health Sciences, Mekelle University

<sup>2</sup>Pharmaceutics Course and Research Unit, Department of Pharmacy, College Health Sciences, Mekelle  
University

<sup>3</sup>Pharmacology and Toxicology Course and Research Unit, Department of Pharmacy, College Health Sciences,  
Mekelle University, Ethiopia, P. O. Box: 1359  
Email: birdpharma@gmail.com

## ABSTRACT

**Background:** Nowadays, irrational uses of drugs, particularly prescription errors are adversely affecting global health and pose problems. Bad prescribing habits lead to ineffective and unsafe treatment, exacerbation or prolongation of illness, distress and harm to the patients and incurring unnecessary costs. The objective of this study was to evaluate the utilization pattern of drugs using WHO prescribing indicators at Ayder Referral Hospital, Northern Ethiopia

**Methods and Materials:** A cross-sectional study was carried out by sampling 384 prescriptions from all prescriptions of the outpatient pharmacy department of the Ayder Referral Hospital from January to April, 2014. A systematic random sampling technique was employed to select prescriptions during data collection. Data processing and analyzing was done using statistical package for social sciences version 20.

**Results:** A total of 1003 drugs were prescribed from 384 prescriptions and the average number of drugs prescribed per encounter was 2.61% ; percentage of encounters with at least an antibiotic prescribed was 321 (32%). Injections were prescribed in 237 (23.6%) of encounters. All of the drugs prescribed were from the essential drug lists of Ethiopia and 936 (93.3%) of drugs were prescribed by generic name.

**Conclusion:** The findings of this study revealed that drug utilization pattern were not optimal in accordance with the standard values of WHO prescribing indicators. There was a higher tendency of polypharmacy and over prescription of antibiotics.

**Keywords:** Drug Utilization, WHO Prescribing indicators

## INTRODUCTION

Despite the fact that the most leading causes of death and disability in developing countries can be prevented, treated or at least alleviated with cost effective drugs, many people do not have regular access to essential drugs. On the top of that those who have access are using drugs irrationally [1].

Over use of drugs (poly pharmacy), inappropriate use of antibiotics (often in inadequate dosage for non-bacterial infections) and overuse of injectables are the common types of irrational drug use which could lead to poor treatment outcomes, drug-drug interactions, high economic burden and to the worst case loss of the patient's life [1].

Inappropriate use of medication, apart from imposing economic impact, results in considerable effect upon the patient's health outcomes and often leads to adverse drug reactions. The problem of adverse drug reaction due to poly pharmacy is more serious in the era of HIV/AIDS due to the high interactive nature of ARV drugs. Furthermore, overuse of antimicrobials leads to increased rates of antimicrobial resistance, major future threat, especially for developing countries like Ethiopia where infectious diseases are more prevalent [2].

Similarly, overuse of injectable as modality of treatment, which is very costly, puts economic load on the patron and non-sterile injections enhance transmission of Hepatitis, HIV/AIDS and other blood-borne diseases. Irrational overuse of medicines can stimulate inappropriate patients' demand for drugs and leads to reduced

access and attendance rates due to drug stock-outs and loss of patients' confidences in the health care system [2].

As literature revealed, worldwide, more than 50 % of all medicines are prescribed, dispensed or sold inappropriately while 50 % of the patients fail to take them correctly [2]. Prescription indicators in Ethiopia show a very high level and often reflect irrational drug use. The average number of drugs prescribed per encounter had been found to vary from 0.8 to 3, the prescribing rate of injections has a range of 0-90% and the prevalence of antibiotics prescribed was found to be 58% (Min 3, Max 100) with a very wide range of 97 [3]. These values are relatively high and over fluctuating as compared with the standards recommended by WHO [3].

Although some studies were conducted in North West Ethiopia, on the overall use of antibiotics and injectable in primary health care facilities [4], misuse of antibiotics in patients [5], low adherences of prescribers to the basic principles of prescription writing and over consumption of anti-infectious drugs [6], little is known regarding the overall rational drug use in Ethiopian hospitals. Hence, this research aims to investigate the drug prescription pattern in ARH through reviewing prescriptions.

### METHODS AND MATERIALS

The study was conducted at Ayder referral and teaching hospital in Mekelle University, which is 783 km away from Addis Ababa, capital city of Ethiopia. The hospital was established in February 2000. The hospital has 500 inpatient beds and serves for about eight million people in its catchment area. Under ARH, there are four hospital pharmacies: OPD Pharmacy, In Patient Pharmacy, ART Pharmacy and Emergency Pharmacy which are providing pharmaceutical services to patients. The OPD pharmacy has three service units: Store, Compounding and Dispensing areas.

A cross sectional design was conducted retrospectively using outpatient records from January 1 to May 30, 2014. Data collection was done using data collection checklist. The study included 384 systematically selected patient records from OPD pharmacy of ARH using systematic random sampling. The sample size is determined by using the following formula:

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where: n = sample size

P = estimate of proportion of prescriptions with inappropriate prescription pattern, 0.5 since there is no research finding regarding estimate of inappropriate drug prescribing pattern in ARH

d = margin of sampling error tolerated, 0.05

Z = the standard normal value at confidence interval of 95% = 1.96

The sample size was:

$$n = \frac{(1.96)^2 (0.5)(1-0.5)}{(0.05)^2} = 384$$

Therefore, 384 patient records/prescriptions were selected from the hospital by systematic random sampling method.

#### Data collection process and quality assurance

A pretest was done taking 20 patient records in Mekelle hospital which has a similar setup with ARH. The quality of data collected was checked on daily basis by the investigators.

#### Data analysis and interpretation

Data checking and clearing were done by the principal investigators before entry into the statistical program. The quantitative data was entered and analyzed using SPSS version 20 and interpretations of the findings were done according to standard values of WHO prescribing indicators [7, 8].

1. The average number of drugs prescribed per encounter was calculated to measure the degree of polypharmacy. It was calculated by dividing the total number of different drug products prescribed by the number of encounters surveyed.
2. Percentage of drugs prescribed by generic name is calculated to measure the tendency of prescribing by generic name. It was calculated by dividing the number of drugs prescribed by generic name by total number of drugs prescribed, multiplied by 100
3. Percentage of encounters in which an antibiotic was prescribed was calculated to measure the overall use of commonly overused and costly forms of drug therapy. It was calculated by dividing the number of

encounters in which an antibiotic was prescribed by the total number of encounters surveyed, multiplied by 100.

4. Percentage of encounters with an injection prescribed was calculated to measure the overall level use of commonly overused and costly forms of drug therapy. It was calculated by dividing the number of patient encounters in which an injection was prescribed by the total number of encounters surveyed, multiplied by 100.
5. Percentage of drugs prescribed from an essential drug list (EDL) was calculated to measure the degree to which practices conform to a national drug policy as indicated in the national drug list of Ethiopia. Percentage is calculated by dividing number of products prescribed which are in essential drug list by the total number of drugs prescribed, multiplied by 100.

#### Ethical considerations

Permission from the head of pharmacy in ARH was secured for collecting the data after official communication was made between Department of Pharmacy, Mekelle University and Medical Directors of ARH. In addition, personal identifiers of prescriptions were not used and confidentiality of information was maintained and hence data was used only for study purpose only.

#### Operational Definitions

- **Combination of drugs:** Two or more drugs that were prescribed for a given health condition. For example, triple therapy for helicobacter pylori induced peptic ulcer was counted as one.
- **Polypharmacy:** concurrent use of two or more drugs for a given patient.

### RESULTS

Out of 384 prescriptions analyzed, a total of 1003 drug products were prescribed. The average number of drugs per prescription was 2.61. The total number of drugs prescribed by generic name was 936(93.3%). Antibiotics were prescribed in 321(32%) encounters and injections were prescribed in 237(23.6%) encounters. All drugs prescribed were from essential drug list of Ethiopia (Table 1).

Table 1: Drug Prescribing Indicators in Ayder Referral Hospital from January 1, 2014 to April 30, 2014, (N=384)

Prescribing indicators	Number	Average/ Percentage	WHO Ideal Values
Average number of drugs per encounter	1003	2.61	(1.6-1.8)
Percentage of encounter with antibiotics	321	32%	(20.0-26.8%)
Percentage of encounters with injection	237	23.6%	(13.4%-24.1%)
Percentage of drugs prescribed by generic	936	93.3%	100%
Percentage of drugs from essential drug list	1003	100%	100%

More than 90% of the prescriptions contained two or more drugs and nearly 10% of the encounters had less than or equal to one drug per encounter (Table 2).

Table 2: Number of Drugs Prescribed Per Prescription in ARH, 2014

Number of drugs per encounter	Frequency	Percentage
Less than or equal to 1 drug	34	8.9
Two	153	39.8
Three	143	37.2
Four	42	10.9
Five and above drugs	12	3.2

Among 305 prescriptions which contained two or more drugs, 109(31%) of drugs demonstrated clinically significant drug -drug interactions.

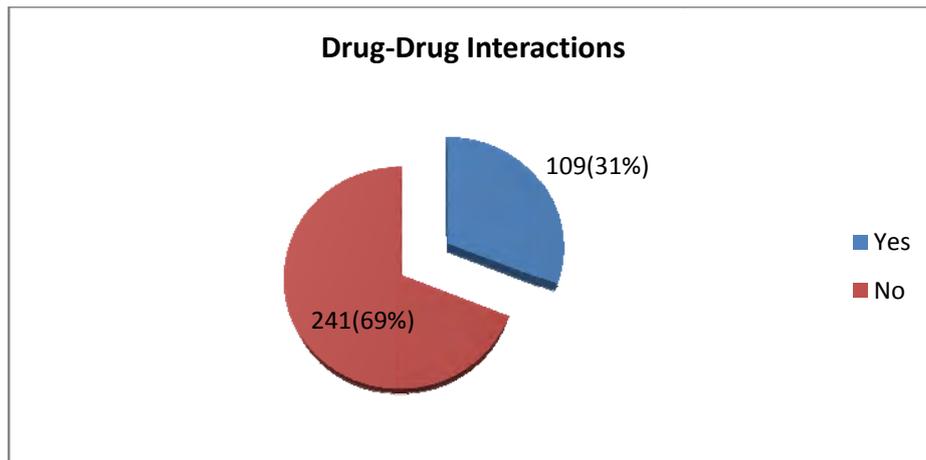


Fig1: The Number and Percentage of Clinically Significant Drug-Drug Interactions Per Encounter in ARH, 2014(N=350)

## DISCUSSION

The WHO core indicators of prescribing practices measure the performance of health care providers in several key dimensions related to the appropriate use of drugs. In the present study, the average number of drugs per prescription, which is an important index of the standard of prescribing, was 2.61. This value is higher than the WHO recommended value of 1.6-1.8. Similarly, this value is also higher than the findings of the studies conducted in North West hospitals of Ethiopia: 0.98 at Gondar Hospital, 1.8 in Bahir Dar Hospital and 2.2 in Debre Tabor Hospital [9]. Moreover, the value is also higher than the studies done in South and South west Ethiopia which revealed an acceptable range of 1.9 and 1.59, respectively [1, 10]. A finding from other developing countries also indicated results; 2.0 in Sudan [11], 3.0 in Nigeria [12], 3.7 in Ghana [13], 3.7 in India [14]. Because of the large number of polypharmacy in many prescriptions, there is clinically significant drug-drug interactions in around 31 % of the encounters; therefore, keeping the mean number of drugs per prescription as low as possible is always preferable to reduce the risk of drug- drug interactions, development of drugs resistance and adverse drug events [11, 15].

Appropriate antibiotic use has both clinical and economic significance to any health system and should be given adequate attention. Inappropriate use of antibiotics can potentially lead to antimicrobial resistance and increase the necessity to use more expensive antibiotics to treat common and life threatening infections [12]. The world health assembly in May 2005 warned that the anti-microbial resistance was rapidly increasing, with resistance of up to 70-90% to original first-line antibiotics (penicillin, ampicillin, cotrimoxazole, and cephalosporins) for dysentery (*Shigella*), pneumonia (*pneumococcal*), gonorrhoea, and hospital infections (*staphylococcus aureus*) [16]. In this study the percentage of encounter with antibiotics was 32 %, which is much higher than the WHO reference value of 20.0 – 26.8 %. However, it is lower as compared to other reports from similar outpatient studies in Ethiopia [9, 10]. The percentage of encounters in which an antibiotic was prescribed was lower as compared to the values in four developing countries: Sudan (71.8%), India (63.3%), and Nigeria (34.4%); however, the value is relatively lower in Ghana (11.9%). The high percentage of antibiotics prescribed in these study settings may be due to cultural beliefs about antibiotics, patients' expectation to receive antibiotics, or prescribers' belief that the therapeutic efficacy of antibiotics is low. It might also have been prescribed appropriately as the settings are a referral hospital where the prescribing pattern is complex [10]. In countries like Ethiopia where infectious disease is a major concern, drug use evaluation should be done to evaluate whether the antibiotics were prescribed appropriately or not.

Prescribing by generic name is known to reduce the cost of drug treatment and rationalizing drug therapy. A relatively encouraging result was found with regard to generic prescribing as it was found to be 93.3%. Nonetheless, this value is still in short of the WHO standard value of 100%. Therefore, generic prescribing should be further encouraged as it is the best way to ensure accessibility of drugs to the patients especially in developing countries where shortage of drug is a major problem [17]. In a similar studies carried out at Hawassa University Hospital, South Ethiopia and Jimma Hospital, South West Ethiopia, the percentage of drugs prescribed by generic name was 98.7 and 75.2%, respectively [1, 10].

Over use of injections leads to economic cost and health hazards as non-sterile injections contribute to the transmission of hepatitis, HIV/AIDS and other blood borne diseases. In this study the percentage of encounters with injection was in the recommended range of WHO (13.4%-24.1%). A similar value in range was obtained in the study conducted in Wolkite Town, South West Ethiopia [16].

## CONCLUSION

The findings of this study revealed that drug utilization pattern were not optimal in accordance with the standard values of WHO prescribing indicators. There was a higher tendency of polypharmacy and over prescription of antibiotics.

## ACKNOWLEDGMENTS

Authors would like to extend deep gratitude to 4<sup>th</sup> year students enrolled for elective course “Introduction to Pharmacoepidemiology” in academic year of 2013/2014 in Mekelle University for collecting data and OPD pharmacy staff members for their generous cooperation and assistance in the data collection process.

## REFERENCES

- [1] Yenet W, Base line survey on drug prescribing indicators for outpatients in Jimma University specialized hospital, South West Ethiopia. *Eth. J. Health Sci.*, 15(2), 2005: 147-155.
- [2] WHO. Promoting rational use of medicine: Core components. Geneva, 2002.
- [3] Federal Democratic Republic Of Ethiopia. Assessment of the pharmaceutical sectors in Ethiopia, Addis Ababa; Ministry of Health, October 2003.
- [4] Desta Z, Abula T, Beyene L, Fantahun M, G/yohannes A, Ayalew S, Assessment of national use and prescribing in primary health care (PHC) facilities in North West Ethiopia. *East Med J.*, 74(12), 1997:758-763.
- [5] Assefa A, Desta Z, Tadesse I, Prescribing pattern of antimicrobial drugs in a teaching hospital in Gonder hospital. *E Afr Med J.*, 72, 1995: 56-58.
- [6] Desta Z, Abdulwhab M, Physicians’ adherence to the basic principles of prescription order writing in Gondar outpatient teaching hospital. *E. Afr. Med. J.*, 73, 1996: 115-119.
- [7] Dukes MNG (ed.). Drug utilization studies: Methods and uses. WHO Regional Publications. EUR Ser No. 45. WHO regional office for Europe, WHO, Copenhagen, 1993.
- [8] WHO. How to investigate drug use in health facilities. Selected drug use indicators. Action programme on essential drugs. Geneva, 1993.
- [9] Desta Z, Abula T, Gebre – Yohannes A, Worku A, Drug prescribing patterns for outpatients in three hospitals in north-west Ethiopia. *Ethiop.J.Health Dev.*, 16(2), 2002:183-189.
- [10] Desalegn AA, Assessment of drug use pattern using WHO prescribing indicators at Hawassa University teaching and referral hospital, south Ethiopia: across-sectional study. *BMC Health Services Research*, 13, 2013: 170.
- [11] Elsalahi SH, Mudawi MME, Ahmed AAE, Evaluation of prescribing patterns in primary health care centres of Khartoum state, Sudan. *An International Journal of Advances in Pharmaceutical Sciences*, 5(4), 2014: 2242-2247.
- [12] Tamuno I, Fadare JO, Drug Prescription Pattern in a Nigerian Tertiary Hospital. *Trop J Pharm Res*, 11 (1), 2012: 146-152.
- [13] Afriyie DK, Raymond T, A description of the pattern of rational drug use in Ghana Police Hospital. *Int. J. Pharm.Pharmacol.*, 3 (1), 2014: 143-148.
- [14] Jain S, Yab Khan Z, Upadhyaya P, Abhijeet K, Assessment of prescription pattern in a private teaching hospital in India. *Int J Pharma Sci*, 3(3), 2013: 219-222.
- [15] Balushi KAA, Shibli SA, Zakwani IA, Drug utilization patterns in the emergency department: A retrospective study. *Journal of Basic and Clinical Pharmacy*, 5(1), 2014:1-6.
- [16] Tsega B, Hailu W, Ergetie Z, Measuring quality of drug use in primary health care facilities: A year long assessment of WHO prescribing indicators, Wolkite Town, South West Ethiopia. *Int.J.Pharm & Ind.Res.* , 2(04), 2012: 485-491.
- [17] Teshale C, Hussein J, Mussa S, Assessment of the Quality of Pharmaceutical Service in Jimma Zone, Oromia Regional State, South West Ethiopia. *International Journal of Pharmacy Teaching & Practices*, 5(2), 2014: 960-966.