

## Research Article

# Drug use Evaluation of Ciprofloxacin in the Outpatient Department of Dessie Referral Hospital (DRH), North East Ethiopia

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**Background:** Many infectious diseases once considered incurable and lethal are now amenable to treatment with antimicrobial agents. They are among the most frequently prescribed medications today although microbial resistance due to evolutionary and misuse threatens their continued efficacy. On the other hand, ciprofloxacin and other antibiotics are often used inappropriately leading to wastage of scarce healthcare resources as well as increasing the risk of the emergence of bacterial resistance. Inappropriate treatment could also lead to the ultimate death of the patient.

**Objectives:** To evaluate ciprofloxacin use in the outpatient department of Dessie Referral Hospital (DRH).

**Methodology:** A retrospective DUE (Drug Use Evaluation) was conducted by reviewing medication records of 372 patients who received ciprofloxacin in DRH during the period of March 16, 2013 to March 15, 2014. A systematic sampling method was used to select patient cards.

**Results:** 287 (77.2%) patients were in the age group of 18 to 49 years. Indication three hundred sixteen (85%), dose 275 (87%) and frequency two hundred ninety seven (93.99%) were consistent with the WHO indicators. Two hundred four (64.56%) of the cases had correct duration of treatment. Percentage of the cases with potential drug interactions was one hundred ninety four (52.15%). Fifteen of ciprofloxacin use was against contraindication.

**Conclusion:** From the current study, it was identified that there was irrational ciprofloxacin use in the outpatient department of DRH even though the drug's use regarding frequency was a better performance and dosing practices were almost appropriate as per the criteria used for the study. There was a great problem concerning the indication and duration of ciprofloxacin drug therapy. Ciprofloxacin use along with potentially interacting drugs and against contraindications was also another problem indicated in the study.

**Keywords:** Drug use evaluation; Drug resistance; DRH; Ciprofloxacin; Antibiotics

**Abbreviations**

WHO: World Health Organization; AFI: Acute Febrile Illness; DRH: Dessie Referral Hospital; DUE: Drug Use Evaluation

**Background**

Rational use of drugs provide patients with appropriate medication to their clinical needs, at dose that meet their own individual requirements for an adequate period of time at lowest cost [1].

Drug use is complex subject involving the physician, the patient, the pharmaceutical institution and dispenser. Each of these is influenced by many factors that are often difficult to measure and quantify. Despite complexity of the drug use, a number of indicators have been developed, standardized and evaluated by WHO/world health organization, which provides useful means of measuring certain aspects of country's drug use.

Antibiotics are among the most frequently prescribed medications today although microbial resistance due to evolutionary pressures and misuse threatens their continued efficacy. Unfortunately we cannot any longer confidently depend upon the discovery of an increasing numbers of novel antibiotics and antimicrobial agents to keep infectious diseases under control but must increasingly pay attentions to neglected public health measures and concentrate upon using antibiotics safely and effectively [1-3].

The discovery and use of antimicrobial agents have brought a major breakthrough in therapy. A lot of previously intractable infectious conditions have now become amenable to antimicrobial therapy. Various classes of antibiotics have been discovered and used with varying degrees of success. Among these are the quinolones. Older members of this group, like the nalidixic acid, have been available for the treatment of urinary tract infections. However the limited use of this drug coupled with the rapid development of resistant strains became a problem [4].

Ciprofloxacin is used for various diseases in Ethiopia, like Bacillary Dysentery, Gastro-enteritis, Pneumonia, Typhoid fever, Chancroid and Gonorrhoea. On the other hand, ciprofloxacin and other antibiotics are often used inappropriately leading to wastage of scarce healthcare resources as well as increasing the risk of the emergence of bacterial resistance [5].

Evaluation of ciprofloxacin use is therefore critical for controlling the emergence of resistant strains as well as cutting down of unnecessary expenditures and also ensuring that patients derive maximum benefit from its use. Therefore, the objective of this study was to evaluate ciprofloxacin use in outpatient department of Dessie Referral Hospital.

## Methodology

### Study area and period

The study was conducted in Dessie referral Hospital which is one of the biggest referral hospitals in the region. The Hospital has 200 beds with 165 health professionals and has different specialized service in five major departments; the pediatrics; surgery; gynecology, Outpatient Department(OPD) and internal medicine. It is located 40kms far from Addis Ababa. The data was collected from April 7, 2014 to April 20, 2014.

### Study design

A retrospective, cross sectional study was conducted to evaluate ciprofloxacin use based on the WHO Criteria along with thresholds set by experts for undertaking drug use evaluation for ciprofloxacin was used. Medical cards of the OPD existing from March 16, 2013 to March 15, 2014 were evaluated and those fulfilling the inclusion criteria were included.

### Eligibility criteria

Cards which contain ciprofloxacin with indication, dose, frequency and duration were included. And cards with incomplete information were exempted from the study.

### Sample size

The size of the sample population was determined according to the Joint Commission on the Accreditation of Health Care Organization (JCAHO) criteria. From the study which encompasses 1 year data of ciprofloxacin use in the outpatient department of Dessie referral hospital, the number of cases (ciprofloxacin indications) per quarter was found to be 867(a total of 3465 annual cases). Therefore 372(10%) was the size of sample in the study [6].

### Data collection

The data was abstracted from the patient charts by two trained year 5 pharmacy students using the data collection format which was adapted from other studies. The data collection format was pre-tested for its validity, reliability and consistency. And the collected formats were cleaned and coded.

### Data processing and analysis

The data was processed using Microsoft excel and analyzed by using WHO for drug use evaluation.

### Ethical consideration

A formal letter was written to Dessie referral hospital administrative. Confidentiality of the information obtained from the

patient’s medical record was maintained throughout the study period by coding and putting in the locked cabinet.

## Results

A total of 372 patient charts containing ciprofloxacin order were included in the study. Two hundred nine (56%) of them were females. Surprisingly, pregnancy and lactating status in females was not indicated in any of the cases. The age range was between fifteen and eighty five years (Table 1).

Percentage of cards containing at least one error was 279(75%). of which 160(57.35%) cards contains one error and 4(1.43%) cards contains four errors (Table 2).

The most common indication of ciprofloxacin was urinary tract infection followed by Acute Febrile Illness (AFIs). In three hundred sixteen (85%) of the cases ciprofloxacin was indicated appropriately based on WHO indicator. Regarding the dosage regimen out of 372 cards, 324 (87%) had correct ciprofloxacin dosing, 350(93.99%) had correct frequency of administration and 239 (64.2%) cards had correct duration (Table 3).

**Table 1:** Age and sex distribution of patients with ciprofloxacin indication in the out Patient department of Dessie Referral Hospital, March 16, 2013 to March 15, 2014.

Variable	Frequency (%)
Age (years)	
<18	15(4)
18-49	287(77.2)
>=50	70(18.8)
Total	372(100)
Male	163(44)
Female	209(56)
Total	372(100)

**Table 2:** Cards containing number of errors in outpatient department of Dessie Referral Hospital from March 16, 2013 to march 15, 2014.

	1 error	2 error	3 error	4 error
Total No of cards with error	160(57.4%)	97(34.8%)	18(6.5%)	4(1.4%)

**Table 3:** Dosage regimen (dose, frequency, duration) of ciprofloxacin in the outpatient department of Dessie Referral Hospital, March 16, 2013 to March 15, 2014.

Indicators	Variable	Frequency (%)
dose	Correct	324(87)
	Under	15(4.1)
	Over	33(8.9)
	Total	372(100)
Frequency	Correct	350(93.9)
	Incorrect	22(6.0)
	Total	372(100)
Duration	Correct	239(64.2)
	Short	45(12.1)
	Long	88(23.7)
	Total	372(100)

**Table 4:** Actual practice versus set criteria for ciprofloxacin in the outpatient department of Dessie Referral Hospital, March 16, 2013 to March 15, 2014.

Criteria	Expectation no (%)	Actual performance (%)
Indication	335(90)	316(85)
Dose	353(95)	324(87)
Duration	316(85)	239(64.2)
Drug interaction	298(80)	178(47.9)
Contraindication	365(98)	354(95.1)
Frequency	372(100)	350(93.9)

One hundred ninety (52.15%) of cards had one or more potentially interacting drugs with ciprofloxacin. From which antacids accounted 59 (30.41%).

The pregnant and lactating patients status was not mentioned for whom ciprofloxacin was indicated in the study, but it was indicated for 15 (4.03%) children whose ages were <18 years which is against contraindications.

Actual performance versus set criteria and thresholds for ciprofloxacin use showed that all the findings were less than the set criteria (Table 4).

## Discussion

The purpose of Drug Use Evaluation is to ensure that drugs are used appropriately, safely and effectively to improve patient health status. In addition, continual improvement in the appropriate and effective use of drugs has the potential to lower the overall cost of care [4]. Success of treatment largely depends on the ability of a physician to diagnose the major health problem(s) of a patient, select the correct drug, dosage form and route of administration, foresees probable adverse reactions and drug interactions, and prevent unnecessary or dangerous duplication of therapy. Implementation of hospital drug formulary can be considered the basis of rational drug use. However the existence of a rationally derived list of drugs approved for procurement and use in a hospital does not ensure that they are prescribed and used correctly [4].

Drugs have to be prescribed appropriately, on the basis of clinical diseases identified through diagnosis. Hence, prescribers should consider WHO recommendations and up-to-date information while prescribing any drug. The study showed that 85% of the Ciprofloxacin indication was appropriate as per the WHO indication criterion [7] which was a poor performance as compared to a threshold set for indication of Ciprofloxacin (90%). It was also poor performance compared to a study from Boru Meda Hospital, Ethiopia (95%) [8] and Kwame Nkrumah University of science and technology Hospital, Kumsi (100%) [9].

Different doses of ciprofloxacin are used for a variety of infections and age groups. Under dose use of the drug results in ineffective control of infectious diseases while overdose results in toxicity problems. Therefore optimal dose has to be used for optimal treatment outcomes. 87% correct dose, 8.9% overdose and 4.1% under dose practices were revealed in the study. This is less than the percentage revealed from a retrospective study conducted in Boru Meda Hospital which showed that 92.5% ciprofloxacin dosing was

correct, 7.5% regimens were overdose and there was no under dose [8].

Drug resistance has become a great problem associated with the use of antimicrobial agents. Prolonged or short duration use of ciprofloxacin, can lead to emergence of microbial drug resistance. Therefore it should be used appropriately and correctly as directed to prevent resistance. Inappropriate duration of therapy was the major problem revealed by the study in Dessie Referral Hospital. 64.2% ciprofloxacin uses were with correct duration of therapy which is very far from the criteria set for ciprofloxacin duration of therapy (95%). 23.7% of the indications were with long treatment periods while short treatment periods accounted for 12.1% of indications which can lead to development of resistance. This result showed better percentage of correct duration as compared with a retrospective study done in Boru Meda hospital, South Wollo Zone, which revealed 45% long duration and 2.5% short duration of therapy [8,10].

The simultaneous use of two or more drugs is recommended in specifically defined situations based on pharmacological rational. However, selection of an appropriate combination requires an understanding of the potential for interaction between the drugs. Interactions may, otherwise, affect the patient negatively, from the study; it was found that 194 (52.15%) of ciprofloxacin use had one or more interacting drug of which antacids accounted 59 (30.41%) which have potential interactions. The study showed high percentage of drug interaction as compared with retrospective study done in Boru Meda Hospital which revealed 40% and antacid interaction 12.5%. Absorption of the drug may be interfered with antacid containing Al or Mg because it forms complex with ciprofloxacin and decrease ciprofloxacin absorption. Drug interaction results are different from the set criteria for drug interaction with ciprofloxacin (90%). This difference might be due to the variation in disease prevalence [8].

Prescribing drugs against contraindications should be avoided unless the benefit of doing so outweighs the risk. Ciprofloxacin was used in 4.03% of the cases, which is contraindication, children under 18 years old when other drugs are available but it is not absolutely contraindicated. The study showed that low percentage of contraindication as compared with retrospective study done in Boru Meda Hospital which is 10%. This variation may be attributed to the unavailability of the pregnancy and lactation history of female patients in the current study [8].

The analysis of actual performance versus the set criteria indicated that there was poor performance compared to the set criteria. Similar result was obtained from study from Boru Meda Hospital except for indication which was better performance.

## Limitations

The study is retrospective study it suffers from all the shortcomings of a retrospective study.

## Conclusion

From the current study, it was identified that there was irrational use of ciprofloxacin in the outpatient department of Dessie Referral Hospital even though the drug's use regarding frequency and dose were a better performance as per the criteria used for the study. There was a great problem concerning the duration of ciprofloxacin drug

therapy. Ciprofloxacin use along with potentially interacting drugs was also another concern. So prescribers are strongly recommended to stick to the available standards and to select less interacting drugs in the presence of co-morbidities or to advice patients on measures to prevent the occurrence of interaction like for antacids to make time gap up on administration. Further prospective drug use evaluation study is recommended on other drugs.

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