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Full Length Research Paper

Antibiotic prescribing pattern in a referral hospital in Ethiopia

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Antibiotics are drugs used for treating infectious disease such as bacterial infections, fungal infections and some parasitic infection but unwise use may contribute to resistance development and poor management of infectious diseases. Though pattern of antibiotic use was determined in different parts of Ethiopia, it is not known in Dessie referral hospital (DRH). This study aimed to assess antibiotic prescribing pattern in Dessie Referral hospital, Northeast Ethiopia, in January, 2012. Retrospective study was conducted from January 16 to 25, 2012, in the outpatient pharmacies of DRH. Prescription cards from January 1, 2011 to December 31, 2011 were selected using random sampling techniques and reviewed using pre-tested data collection format. Finally data was edited, coded, tallied and cleaned. Descriptive statistics was computed. On review of 770 prescription papers, 378 (24.37%) antibiotics were prescribed. Antibiotics prescribed with over, under and optimum dose were 19 (5.02%), 13 (3.43%), 346 (91.53%), respectively. About 15 (4%), 10 (2.6%) and 1 (0.3%) of antibiotics were prescribed by incorrect frequency, short and extended duration of administration, respectively. The most common dosage forms of antibiotics prescribed were solutions 120 (33.3%), tablets 103 (27.24%) and capsules 72 (19.04%). Oral route 219 (58%) followed by parental route 135 (35.7%) was the most commonly used route of drug administration. There was rational use of antibiotics in the hospital though there are some problems that have to be considered.

Key words: Antibiotics, prescription, drug, pattern.

INTRODUCTION

Antibiotics are among the drugs most commonly used in health care systems but prescription is mostly made on empirical basis by prescribing broad-spectrum antibiotics. Although they have been dubbed “miracle drugs”, antibiotics are not always effective due to development of resistance (Murry et al., 1978; Lim et al., 1993; Weinstein, 2006; Kiivet, 1998). Thus, appropriate drug use utilization studies are important tools to evaluate whether antibiotics are properly utilized in terms of efficacy, safety, convenience and economic aspects at all levels in the chain of drug use. Regardless of considerable improvements in the availability and control in hospitals, rational antibiotic use is still a worldwide concern (Dukes, 2012; WHO regional Office for Europe, 1993).

Wide spread use of antibiotics has contributed to antibiotic resistance among common bacterial species. This is influenced by interplay of the knowledge, expectations of prescribers and patients, economic incentives, characteristics of a country’s health system, and the regulatory environment. Patient-related factors such as believe and perception towards medication and non adherence are major drive of inappropriate antibiotic use. In addition, poor education, absence of drug information,

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lack of resources, poor training, patient load and inaccessibility of antibiotics can cause irrational use of antibiotics. The consequences of inappropriate antibiotic use and resistances are severe and can resultin unnecessary health care expenditure, treatment failures and/or adverse drug effects. (Hogerzel, 1995; Moallering, 1979, 1974, 1977; Negussu, 1996). Appropriate use of antibiotics is important from a clinical perspective and usually, the selection of antibiotic drugs should be based on the microbiological data on bacterial sensitivity. Regular patient card review, reducing the spectrum of coverage, and monitoring response as well as duration of therapy can contribute to rational use of antibiotics (Kiivet, 1998; Moallering, 1979; 1977; 1974). The data regarding pattern of antibiotics use in the Dessie referral hospital is still lacking or scarce. This study is thus initiated to fill such information gaps by determining the pattern of antibiotic use in the hospital.

MATERIALS AND METHODS

Study area and period

Retrospective study was conducted from January 16 to 25, 2012, in outpatient department (OPD) pharmacies of Dessie Referral Hospital located in Dessie town, 401 km from Addis Ababa. DRH is the only referral hospital in Northeast Ethiopia with 200 beds and 165 health professionals. Medication distribution is centralized and there is no floor-based decentralized pharmacy service currently available in each inpatient wards except one inpatient. There are two outpatients and one special pharmacy serving all the wards of the hospital.

Study subjects

All prescriptions dispensed in the hospital pharmacies during the last one year were included in the study. The sample size was determined using the statistical formula (Degu et al., 2005).

$$Ni = \frac{(Z\alpha/_2)^2 * P\,[1-P]}{d^2}$$

Where, $Z\alpha/_2$ is probability coefficient for desired interval [CI = 95%], Ni: minimum sample size determined, P: proportion of population possessing characteristics of interest /50% prevalence/, d = margin of sampling error tolerated (5%), 1-p = proportion of population that do not possess the character of interest.

$$Ni = \frac{(1.96)^2 * 0.5[1-0.5]}{(0.05)^2} = 384.16 \sim 385$$

For convenience, the minimum sample size was doubled to 770 prescriptions. These 770 prescriptions were selected randomly from the total prescriptions prescribed during the one year period, 385 from each outpatient pharmacy. Before selection, the total prescriptions in the pharmacy were counted to determine interval for random selection. Only prescription within the hospital were included but prescriptions from other health settings dispensed in the hospital, those prescriptions containing drugs which were not clear to read**,** and prescriptions containing only medical supplies such as syringe, needle, catheter were excluded from the study.

Data collection process

The data were collected by three trained data collectors (pharmacy graduating class students) using pretested data collection formats. Data were collected from the prescription card but in addition patient card was used for detailed information to determine correctness of the prescription. The collected data were checked for completeness and consistency before processing. The collected data were compared with standard treatment guidelines, national formulary and standard textbooks to evaluate correctness of drug use (Drug Administration and Control Authority of Ethiopia (STG), drug list for Ethiopia and national formulary, 2002; 2004; 2008). The collected data were edited, coded, tallied, and cleared. Descriptive statistics were computed to meet the study objective.

Ethical considerations

Prior to data collection, the head of hospital and pharmacy was requested by formal written letter from school of pharmacy of Wollo University. To ensure confidentiality, name of patients and health professionals was replaced by initials, and data was used for the purpose of study only and discarded after finishing the study.

RESULTS

Patient related information

From the total of 770 prescriptions collected, the percentage of prescriptions containing name of the patient, sex, age, and address were 769 (99.86%), 409 (53.14%), 614 (79.7%) , and 215 (28.0%), respectively (Table 1).

Drug related information

About 1,551 drugs were prescribed of which antibiotics prescriptions were 378 (24.37%). Amoxicillin 72 (19.05%), chloramphenicol 53 (14.02%) and ampicillin 50 (13%) being the three most commonly prescribed antibiotics (Table 2). About 19 (5.02%) of the antibiotics were dispensed by over dose while 363 (96%), and 367 (97%) were prescribed in correct frequency and optimum du-ration of administration, respectively (Table 3). Majority of antibiotics were prescribed by oral route 219 (58%) followed by parental route 135 (35.7%). Regarding the dosage form of antibiotics solutions, 126 (33.3%), and tablets 120 (31.7%) were the most commonly prescribed dosage forms (Table 4).

Prescribers related information

Only on 154 (20%) and 79 (10.2%) of prescription papers were names and qualifications of the prescribers specified,

Table 1. Patient information on the prescription in Dessie Referral Hospital, Northeast Ethiopia, January, 2012.

Patient related information	Frequency (%)
Name of the patient	769 (99.86)
Sex	409 (53.14)
Age	614 (79.7)
Address	215 (28)
Date	770 (100)
Card Number	770 (100)

Table 2. The top ten prescribed antibiotics in Dessie referral Hospital, Northeast Ethiopia, January, 2012.

Patient related information	Frequency (%)
Amoxicillin	72 (19.05)
Chloramphenicol	53 (14.02)
Ampicillin	50 (13.22)
Ceftriaxone	43 (11.38)
Ciprofloxacin	28 (7.41)
Gentamycine	25 (6.61)
TTC eye ointment	24 (6.35)
Cloxacilin	19 (5.03)
sulphamethoxazole + trimetoprim	17 (4.5)
Amoxicillin +clavulonic acid	14 (3.7)
Total	378 (100)

though all were signed.

DISCUSSION

According to this study, 769 (99.86%) contain name of patients. This was better when compared with a study in Asir, Saudi Arabia for which only 94.6% of the prescriptions contained patients name (Feghali et al., 2011). Though the figure is low 1 (14%), it might have created problem during dispensing of the right drug to the right patient, and wrong drug might have been given to wrong patient.

In this study, about 291 (41.57%), 86 (12.29%), and 485 (69.93%) prescriptions did not contain patients sex, age, and address, respectively but all prescriptions contained correct date, and patient card number. When compared with study done in Bahrain health facilities, prescriptions which did not contain any information on patient address (3.8%), age (3.5%), and sex (0.5%) were higher in this study (Aikhasci-alnasia et al., 2005). But figures for sex, age and address were lower in this study when compared with another study in hospital pharmacy in Asir, Saudi Arabia and France which showed prescriptions that did not contained age, and sexes were 22.7 and 49.7%, and no prescription contained patient address (Feghali et al., 2011; Francoisp et al., 1997).

About 378 (24.37%) antibiotics were prescribed in this study. This was different from other studies in other regions of the countries like Bahir Dar university Hospital (41.9%), University Gondar hospital (36.9%) and Debretabor (64.1%) (Desta et al., 2002) Jimma University specialized hospital 33.1% (Mohammed et al., 1997). The same was true when compared with studies in other countries USA (60%) (Strolley et al., 1992) and China 31% (Jun et al., 2011). It was extremely lower when compared with a study in surgical ward in Ethiopia which was 70% (Abula et al., 2004). The difference in the antibiotic prescribing pattern among different regions of the country might be due to difference in the prevalence of infectious diseases, differences in the qualifications and prescribing behaviors of prescribers (Riaz et al., 2011) where medical intern prescribers are common in the teaching hospitals of other regions, and use of antibiotics for prophylaxis in addition to treatment in surgical ward. This indicated better use of antibiotics in this study area.

Amoxicillin 72 (19.05%), chloramphenicol 53 (14.02%), ampicillin 50 (13.22%), and ceftriaxone 43 (11.38%) were the most commonly prescribed antibiotics in this study. This was different from studies in USA and Europe where tetracycline groups were most frequently used, followed by penicillin's (Kiivet et al., 1998; Strolley et al., 1992) but almost similar with study in surgical ward in Ethiopia ampicillin and chloramphenicol being among commonest ones. This might be due to the difference in purpose of use and prevalence of infectious diseases.

About 13 (3.43%) and 19 (5.02%) of drugs were prescribed as over, and under doses, respectively. This was different from study in Jimma Hospital outpatient pharmacy for which over and under dose of antibiotics was 18 and 14%, respectively (Mohammed et al., 1997). This difference might be due to variation in prescribers experience and qualification where in this study the prescribers were at least general Practitioners and had more experience than in Jimma where student interns are the major practitioners.

In this study, almost all antibiotics were prescribed by correct strength. This was different from study carried out in private health institutions in Wollo Region for which only 40.2% of antibiotics were prescribed by correct strength (Teka, 1996) while the study done in a Hospital pharmacy in Asir, Saudi Arabia showed that the strength of antibiotics were included only in 25% of the prescription (Feghali et al., 2011).

In this study, 219 (58%), 135 (35.7%), and 24 (6.3%) of antibiotics were prescribed by PO, parental (IV, IM, SC) and topical, respectively. This was different from study in Cap cost, Ghana where over 60% of the patients were prescribed one or more injectable antibiotics (Desantis et al., 1999). The same is true when compared with pediatric patients in Kathmandu where about 75% were prescribed antibiotics (Palikhe, 2004). The difference might be due to difference in perception of community towards injection use, severity of infections and difference

Table 3. Appropriateness of antibiotics prescribed form in Dessie Referral hospital, Northeast Ethiopia, January, 2012.

Name	Dose			Strength	Frequency		Duration of treatment		
	Over	Under	Optimum	Correct	Correct	Incorrect	Long	Short	Optimal
Amoxicillin	4	3	65	72	72	-	-	3	69
Chloramphenicol	-	-	53	53	50	3	1		52
Ampicillin	1	3	46	50	45	5	-	7	43
Ceftriaxone		-	43	43	43	-	-		43
Ciprofloxacilin	-	-	28	28	28	-	-	-	28
Gentamycine	-	2	23	25	25	-	-	-	25
Tetracycline eye ointment	-	-	24	24	20	4	-	-	24
Cloxacilin	-	-	19	19	19	-	-	-	19
Cotrimoxazol	8	3	6	17	15	2	-	-	17
Norfloxacin	3	-	10	13	13	-	-	-	13
Amoxicillin+ clavulonic acid	-	-	14	14	14	-	-	-	14
Doxycyclin	-	-	8	8	7	1	-	-	8
Crystalline penicillin	3	2	4	9	9	-	-	-	9
Erythromycin	-	-	3	3	3	-	-	-	3
Total No (%)	19 (5.02)	13 (3.43)	346 (91.53)	378 (100)	363 (96)	15 (4)	1 (0.3)	10 (2.6)	367 (97)

Table 4. Frequency of prescribed antibiotics by route of administration and dosage form in Dessie Referral hospital, Northeast Ethiopia, January, 2012.

Name	Route of administration			Dosage form				
	Oral (PO)	Parental	Topic	Solution	Suspension	Ointment	Tablet	Capsule
Amoxicillin	72	-	-	-	22	-	-	70
Chloramphenicol	2	51	-	51	-	-	-	2
Ampicillin	43	7	-	7	-	-	43	-
Ceftriaxone	-	43	-	43	-	-	-	-
Ciprofloxacilin	28	-	-	-	-	-	28	-
Gentamycine	-	25	-	25	-	-	-	-
TTC eye ointment	-	-	24	-	-	24	-	-
Cloxacilin	19	-	-	-	5	-	19	-
Cotrimoxazol	17	-	-	-	17	-	-	-
Augmentin	14	-	-	-	-	-	14	-
Norfloxacilin	13	-	-	-	-	-	13	12
Crystalline Penicillin	-	9	-	-	9	-	-	-
Doxycyclin	8	-	-	-	-	-	-	8
Erythromycin	3	-	-	-	-	-	3	-
Total no. (%)	219 (58)	135 (35.7)	24 (6.3)	126 (33.3)	53 (14)	24 (6.3)	120 (31.7)	92 (24.3)

in age of patients.

About 154 (20%) prescriptions did not contain name and 691 (89.8%) did not specify the qualification of prescribers, but all prescriptions were signed. This was different from a study done in hospital pharmacy in Sir, Saudi Arabia, where 83.3, 9.6 and 81.9% of the prescriptions contained name, address and signature for the prescribers, respectively and in France where full name and signature was written only for 7.8% of prescriptions (Feghali et al., 2011; Francois et al., 1997). This study being retrospective did not consider the outcome of drug use, it did not check whether the medication is dispensed or not. Incomplete information both in patient card and prescription paper were other limitations.

Conclusion

There is appropriate prescribing practice of drugs in the Dessie referral hospital. But many antibiotics were still prescribed without information and/or inappropriate dose and frequency of administration. The penicillins were the most frequently prescribed antibiotics in the study area. Thus, prescribers should regularly check completeness of prescription cards and pharmacists should prepare a continuous health education program on rational use of antibiotics and of course should work in a team sprit with prescribers. Health care providers need to establish a system which can support the prescribing physicians to ensure appropriate medication prescribing practices, and a monitoring of prescribing pattern of prescribers by the concerned bodies may further ensure appropriate use of antibiotics.

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