Original paper

Misuse of Antibiotics in Al-Hussein Teaching Hospital in Kerbala

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Abstract

Background: Antibiotics (AB) are available and widely used all over the world. However, the overuse and misuse of antibiotics generates unnecessary costs, produces unwanted side effects, and causes the emergence of resistant bacteria that is a raising serious problem especially in developing countries.

Objectives: To assess the use of antimicrobial drugs and rationality of its use.

Methods: An analytic cross-sectional study was carried out in Al-Hussein Teaching Hospital in Holly Kerbala City in Iraq. A sample of 302 hospitalized patients was randomly selected from coronary care unit, medical wards, and surgical wards, clinical data were collected using specific questionnaire through direct interview with patients and from patient's case sheets during the period from 5th December 2013 to 30th June 2014. Ethical approval was taken from Scientific Council of Family Medicine in Arab Board Committee\ Baghdad. Data were entered and analyzed using SPSS program version 16. A p value of less than 0.05 was considered statistically significant.

Results: Antibiotics were prescribed in 81.5% of hospitalized patient. The collective rate of irrational use of antibiotics was 83.3%. Inappropriate antibiotic use was significantly higher in patients who had been hospitalized in surgical branches wards (91.8%) followed by general surgery wards (88.4%), while the lower antibiotic misuse was in coronary care unit ward (73.9%). ABs indication in Medical wards was 100% Empirical, while 75% of ABs indication in General surgery ward was prophylactic.

Conclusion: The rate of irrational antimicrobial use was high in hospitalized patients, and more in surgical wards. The antibiotic selection was optional and not according to any guidelines or recommendations. The antibiotics prescription was mainly empirical in medical wards, while it was prophylactic in surgical wards. Further, the use of culture and sensitivity test was very limited. These attitudes are probably leading to more risky side effects and drug resistance. Strict guidelines and valid policies need to be adapted in each hospital to decrease the antibiotic misuse.

Keywords: Antibiotics, Antibiotics misuse, Antibiotic prescription, Rational, Irrational

Introduction

Antibiotics (AB) are widely used medicines to treat both life-threatening and trivial infections. Their erroneous use increases the risk of bacterial drug resistance [1]. Medications administered inappropriately not only leads to wastage of resources but also carries potential serious adverse effects for the users [2]. Resistance to antimicrobial drugs by the microorganism is increasing due to improper use of antibiotics, where microbial resistance is a major challenge to health worldwide [3].

Using of antimicrobials and the emergence of resistant microorganisms had got attention since the introduction of penicillin. Bacterial resistance has a negative impact on treatment fate, increasing death rates and hospitalization

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time. Thus, the improper use of these drugs culminates in drug-resistant infections, deaths and direct to the use of more costly antibiotics [4, 5].

Hospitals have a main role in the development of antimicrobial resistance. Globally antibiotics usage in hospitals is increasing, however, over a third of AB prescriptions are not compliant with evidence-based guideline [6]. Limiting antibiotics is essential in addressing and controlling the development of resistance, so a restrictive antimicrobial policy in combination with effective infection prevention control measures is a key in any AB control strategy [7, 8].

In most countries the majority of antibiotics are prescribed in primary care were 50% of prescription are of questionable value [9, 10]. In Iraq, the situation might be different or not well studied. However, in hospitals antibiotics are given in large quantities and of a broad spectrum. Moreover, departments of hospitals are condensed with patients who are at risk of acquiring infections of resistant microorganisms. This raises the importance of studying in hospital AB use, to estimate and try to limit the unnecessary prescribing. Further, it's an essential step in combating the development of AB resistance [10].

Irrational prescription of antibiotics by healthcare providers could be related to the non-assurance of the type of infection, whether viral or bacterial. Physicians struggle whether to give or delay antibiotics prescription. Also, they struggle whether to prescribe a narrow spectrum or broad-spectrum antibiotics. So, many physicians prescribe broad-spectrum antibiotics to make sure better outcomes. Further, some physicians overprescribe antibiotics as a response to their patients' expectations [11].

Clinicians tend to choose an initial empirical therapy before identification of the bacteria and before susceptibility test results are available. Habitual use of similar regimens antibiotic for most patients probably lead to increased resistance and/or increased rates of inadequate coverage [12].

Increasing rates of resistance make physicians prescribe multiple broad-spectrum ABs, which can aggravate the cycle of increasing resistance and create an economic burden to society [13, 14].

Successful management of patients suffering from bacterial illness should depend upon identification of types of organisms that cause the disease and the selection of an effective AB against them [15]. Updated information on pathogens and their antimicrobial resistance patterns are crucial for proper treatment of patients, monitoring drug resistance and planning effective use of drugs [16].

Blood culture remains the most practical and reliable method for detection of microorganisms in patient blood. Although recent advanced techniques such as nucleic acid probes and polymerase chain reaction (PCR) have been developed to diagnose bloodstream infections [17].

Since AB misuse is a serious growing condition in Iraq without real steps to combat it, and no adequate data available on the subject. This study aims to measure the size of AB use, misuse and to assess the rationality of AB use at Al-Hussein Teaching Hospital.

Patients and methods

An analytic cross-sectional study was conducted in Al-Hussein Teaching Hospital in holly Karbala city. Data collection was carried out during the period from 5th December 2013 to 30th June 2014.

A systematic random sample of patients of different age groups and both genders were selected by choosing every fourth patient from all patients admitted to the surgical, internal medicine and coronary care unit (CCU) wards. The critically ill patients were excluded from this study.

The information was gathered via a structured questionnaire developed for the purpose of study after thorough literature review and filled by direct interview with the patients or their accompanier and also from patients' case sheets data. The

questionnaire includes general information like patients case sheet number, age, gender, provisional diagnosis, history of any chronic disease, previous hospitalization, and drug allergy. Also the types, dosage, duration of antibiotic administered and any microbiological test results. The last section of the sheet was allocated to the rationality of antibiotic use whether rational or irrational and the type of irrational use (types of error).

Irrational antibiotic use was classified as: No indication; Inappropriate AB; Inappropriate dose, Inappropriate combination of ABs; Too long or too short duration; Too broad; and Too narrow spectrum. The rationality of AB use was determined according to recognized international guidelines and previous studies [18-21].

Ethical approval was taken from Scientific Council of Family Medicine in Arab Board Committee\ Baghdad, and from Research Ethics Committee in Kerbala Health Directorate and a verbal consent were taken from each individual prior to data collection after a short explanation of study objectives .

Data were entered and analyzed using SPSS program version 16, qualitative variables were expressed in numbers and percentages, while quantitative variables were expressed as mean ± standard deviation (SD). Chi-square or Fisher exact test was used for data analysis accordingly, and p-value considered statistically significant when it is less than 0.05.

Results

A total of 302 patients were collected, their ages ranged between 1 to 96 years with a mean age ± SD of 44.55 ± 24.11 years. Females forms 54.6% of the sample and nearly 53% were known to have chronic diseases as shown in Table 1. While 246 (81.5%) had received AB, of that 83.3% of AB prescription was irrational as shown in figures 1 and 2. The number of AB used ranged from 1-5 with mean 1.63 ± 0.75. However, only 7 patients were sent for culture and sensitivity (C\S).

The majority of AB prescription in the sample (57.3%) was empirical, followed by the prophylactic prescription which was (42.3%) while only one case (0.4%) of prescription was according to (C\S), which was excluded from the further statistical analysis.

There was a highly significant statistical association between AB prescription and hospital wards, where the highest percentage of AB prescription was in the general surgery ward (98.6%), and the lowest one was in the CCU ward (37.7%) as shown in table (2).

Also, there was a highly significant statistical association between type of AB prescription and hospital wards, as in CCU and internal medicine wards prescription of AB was (100%) empirical therapy, while in surgical wards the majority of prescription was prophylactic as shown in table (3).

However, 99% of prophylactic prescription was misuse with a highly significant association as shown in table (4). Further, there was a strong statistical association between irrationality of AB use and hospital wards were surgical wards had higher percentages of irrational use than medical wards as shown in table (5).

Regarding the type of irrational use of AB (types of misuse) the highest misuse type was the too long duration of AB prescription (42%), followed by the prescription of AB without indication (31.7%), while there were no inappropriate dose or too broad spectrum AB prescription as shown in Figure (3).

Moreover, the error of too long duration occurred mainly in the surgical wards while the error of no indication for AB occurred mainly in the medical wards

Table 1. Distribution of study population according to demographic characteristics.

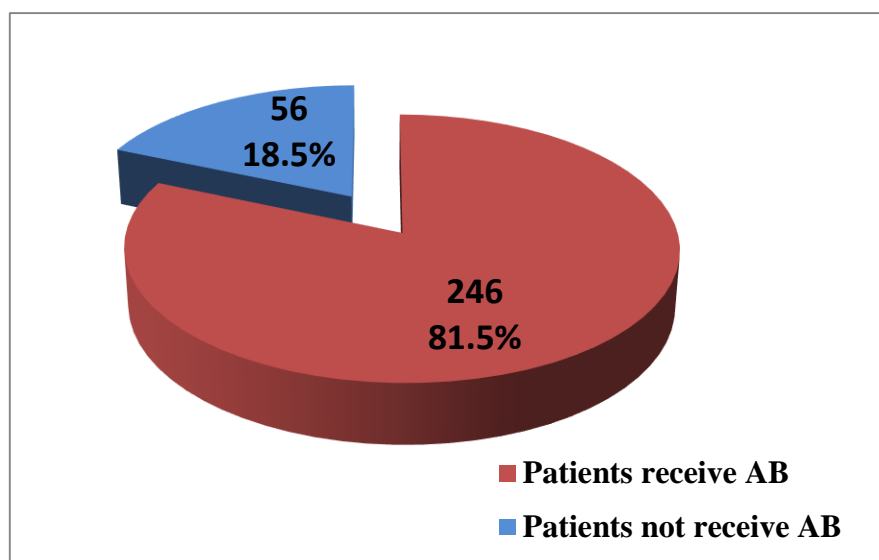| Characteristic		Number (N) 302	% 100.0
Age group\ years	<15	46	15.2
	15 – 39	82	27.2
	40 – 59	64	21.2
	≥60	110	36.4
Gender	Male	137	45.4
	Female	165	54.6
Wards	CCU	61	20.2
	Internal medicine	90	29.8
	General surgery	70	23.2
	Other surgical branches	81	26.8

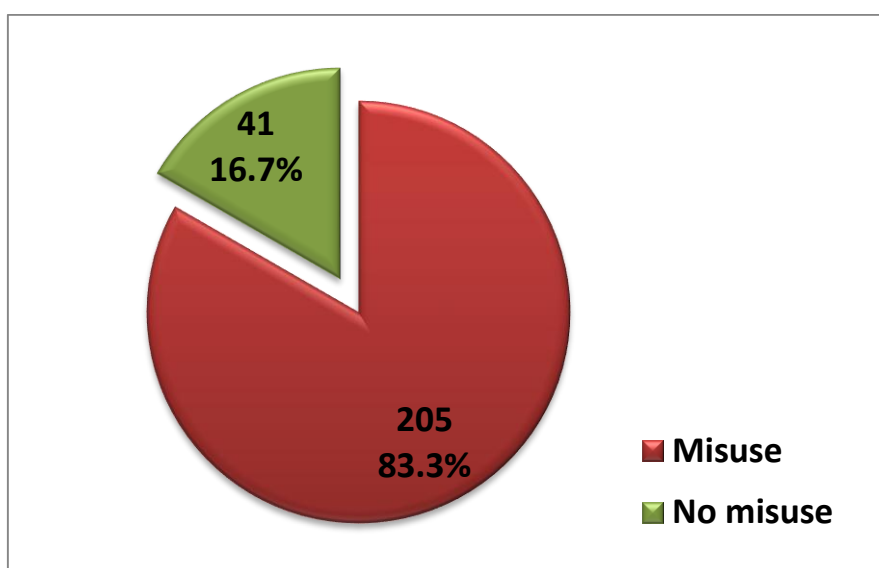**Figure 1.** Prescription of Antibiotics.

Figure 2. Misuse of Antibiotics.

Discussion

Not surprising with the general trend of overuse of AB in Iraq, AB were prescribed in 81.5% of the sample. This is lower than

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AB prescription in a hospital in China which was (83.4%) [22]. But it's higher than AB prescription reported in two multihospital studies in Switzerland and Turkey which were 25% and 30.6% respectively [21, 23].

Table 2. Association between the wards and prescription of AB

	Prescription Of AB		Total N / %
	No N / %	Yes N / %	
CCU	38 62.3%	23 37.7%	61 100.0%
Internal Medicine	9 10.0%	81 90.0%	90 100.0%
General Surgery	1 1.4%	69 98.6%	70 100.0%
Other Surgical branches	8 9.9%	73 90.1%	81 100.0%
Total	56 18.5%	246 81.5%	302 100.0%

P value < 0.001

Table 3. Association between the wards and type of AB prescription.

	Type Of AB Prescription		Total N / %
	Empirical N / %	Prophylactic N / %	
CCU	23 100.0%	0 0.0%	23 100.0%
Internal Medicine	81 100.0%	0 0.0%	81 100.0%
General Surgery	17 25%	51 75%	68 100.0%
Other Surgical branches	20 27.4%	53 72.6%	73 100.0%
Total	141 57.6%	104 42.4%	245 100.0%

P value < 0.001

Table 4. Association between the rationality of AB use and types of AB prescription.

	Prescription Of AB		Total N / %
	Empirical N / %	Prophylactic N / %	
Misuse	102 72.3%	103 99.0%	205 83.3%
No Misuse	39 27.7%	1 1.0%	40 16.7%
Total	141 100.0%	104 100.0%	245 100.0%

P value < 0.001

Table 5. Association between the wards and the rationality of AB use.

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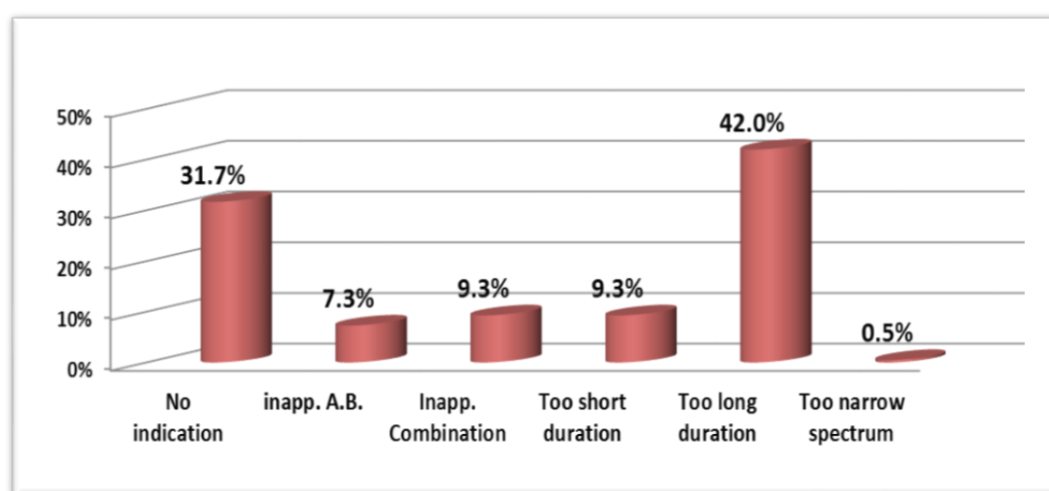|	Rationality Of AB Use		Total N / %
	Irrational Use N / %	**Rational Use N / %**	
CCU	17 73.9%	6 26.1%	23 100.0%
Internal Medicine	60 74.1%	21 25.9%	81 100.0%
General Surgery	61 88.4%	8 11.6%	69 100.0%
Other Surgical branches	67 91.8%	6 8.2%	73 100.0%
Total	205 83.3%	41 16.7%	246 100.0%

P value=0.009

Figure 3. Types of irrational use of AB (errors)

Among patients who received AB, 48.4% had received one AB. This is lower than the 59.1% and 71.7% that was reported in Baquba City\Iraq and in China respectively [24,22]. This highlights that majority are prescribing a combination of antibiotics up to five medication recorded .

A higher percentage of ABs had been prescribed empirically 57.3%. That is lower than empirical prescription in a Turkish study 78.4%. Further, prophylactic prescription of AB was 42.3% which slightly lower than that in same previous study 44.2% [23]. Also, only one patient had received AB according to results of C\S. This is much lower than AB prescription according to C\S of 11.5% in same Turkish study mentioned [23].

The collective rate of irrational use of ABs was 83.3%. That is higher than the 20% and 56.6% of irrational ABs use in Egyptian and Chinese studies respectively [18,22].

A higher ABs prescription was in general surgery ward 98.6% than that in medical wards. Same issue found in China Hospital, in which the AB prescription was higher in general surgery 90.12% [22]. Further, in Turkish and Swiss studies the majority of AB prescription was in general surgical wards while lower percentages were in medical wards [23,21].

Antibiotics prescription in the medical wards was almost empirical, while in surgical wards the prescription was mainly prophylactic. About 72.3% of empirical prescription was misuse while in Swiss study, nearly 41% of empirical prescription was misuse [21]. However, a study at a Turkish University hospital reported that 51.5% of empirical prescription was

misuse, that had declined to (9.0%) after the initiation of the antibiotic restriction policy in that hospital [25].

Nearly 99% of prophylactic prescription was misuse. This is higher than 72% in a Swiss study [21], also higher than the 67.9% reported in a Turkish study. Further, in the last study, the percentage declined to 37.5% after the initiation of the AB restriction policy [25]. This obviously raises the necessity for applying guidelines or restriction policy for AB use in hospitals.

Inappropriate AB use was significantly high in surgical wards; also inappropriate AB use was significantly high 75.35% in general surgery department in China [22]. While in a Turkish study inappropriate AB use in surgery was only 14.2% after initiation of the AB restriction policy [25].

The lowest inappropriate AB use was in CCU of 73.9%. A Turkish study found inappropriate AB use in medical wards was only 6.2% after initiation of the AB restriction policy [25]. Oppositely in an Egyptian study, the highest misuse had been reported in the CCU [18].

The type of error of "using AB without indication" had occurred mostly in CCU and internal medicine wards. While the type of error of "too long duration of AB use" mostly occur in surgical wards.

Though, the presence of the Surgical Antibiotic Therapy guideline of Al-Hussein Teaching Hospital, most surgeons do not follow it. Since most surgeons prescribe prophylactic ABs before and after surgery and for a long duration. A possible explanation could be the non-trust in the sterility of operative theater and surgical wards, or they do not believe in these guidelines.

Anyhow, guidelines are very limited in health services guidelines are very limited in health services in Iraq and if present, not to be followed is not uncommon.

In conclusion, the irrational use and misuse of AB is quite common in Al-Hussein Teaching Hospital in Kerbala. Perhaps, it does not differ greatly than the status in other Iraqi hospitals. Also, the misuse appears higher in surgical wards. The AB prescription was mainly empirical in medical wards, while it was mainly prophylactic in surgical wards.

Selection of ABs was optional and not according to any guidelines or recommendations, despite the presence of some guidelines. Further, the use of C/S test was very limited that probably leads to more aggressive burden and increase the possibility of developing drug resistance. We recommended strict guidelines and applicable national policy for ABs use to be developed and should be adapted to decrease the risk of microbial resistance against antibiotics. Meanwhile, each hospital should work seriously to put local guideline to control the AB misuse.

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