

**Original article****Evaluation of antibiotic prescription pattern in Fatimah****Zahra heart hospital of Sari, at north of Iran; one year survey**

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**Abstract**

**Background:** Given the widespread use of antibiotics, antibiotic resistant organisms that cause nosocomial infection is increasing rapidly. To modify the pattern of antibiotic consumption requires accurate information about their current prescription.

**Material & method:** This study aimed to investigate the pattern of antibiotic use in Sari Fatima Zahra hospital from April 2011 to March 2012. This study was a retrospective drug utilization evaluation based on ATC / DDD system.

**Results:** Sari Fatima Zahra hospital had an occupancy index 0/91 with an 8564 Admission. In total 355 patients received antibiotics that 55.25% were male &44.8% female. The most common illnesses were including; pneumonia (45.6%), surgical wound infection (16.3%), endocarditis (15.2%), urinary tract infection (6.8%), sepsis (6.5%) &mediastinitis (9 / 3%), respectively. The antibiotic cost was 15.14% of all drug costs. Antibiotics were administered intravenously in 93.34% of cases. The most commonly used drugs were ceftriaxone (in 65.6%) that the most common indication for its use was pneumonia (59.7%) & endocarditis (16.7%), respectively. The second was vancomycin (54.6%) that the most common causes for its use were pneumonia (29.8%), surgical wound (26.8%) and endocarditis (21.8%), respectively. Clindamycin was prescribed in 35.3% and imipenem in 21.4% of patients. The use of antibiotics using the defined daily dose was calculated 423 for total drugs and 140.32 &111.3 for ceftriaxone & vancomycin, respectively.

**Conclusion:** Despite the relatively good use of antibiotics in our hospital, the use of essential drugs, vancomycin and imipenem was high. This is partly due to type of our

patient's disease (heart surgery) and partly due to lack of sufficient knowledge about common objects antibiotic resistance in hospitals. Thus, scientific, accurate and acceptable studies in this context would be helpful.

**Key words:** *Antibiotic use, Antibiotic resistance, Antibiotic stewardship*

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## Introduction

Immethodical use of antibiotics duo to increase the risk of antibiotic resistance in pathogenic organisms especially etiologic agents of nosocomial infections has become a serious problem and even the world could finally return to the pre antibiotic era (1,2).antibiotic resistance in hospitals that are center of surgery is very important because antimicrobial prophylaxis that be used is empiric and if resistance be occurred, surgical successful will be decreased (3-6). On the other hand, the indiscriminate use of antibiotics increases the expenses of hospital and patients unnecessarily, and choosing of appropriate antibiotic and determination of treatment duration is a complex process that requires a combination of pharmacologic and microbiologic knowledge and true clinical judgment (7-9). Meanwhile, modify the pattern of antibiotic prescribing need to correct information on the previous administration in each

region hospital (10, 11). According to the World Health Organization to achieve a rational consumption of drugs requires choosing of drugs that are more effective and with less cost and side effect to remove the needs of patients in specific geographic area, as well as the dose of drugs and duration of treatment is very important (12-14).The aim of this study was to investigating of the antibiotic using pattern (including indications, dosage, duration and complications) in Fatimah Zahra heart hospital of Sari and compare them with the global and regional values, as basal information for correction of existent defects.

## Materials and Methods

This is a retrospective study that evaluate drug utilization based on international standard system ATC / DDD (Anatomical Therapeutic chemical / Defined Daily Dose) recommended by the World Health Organization (WHO) . ATC system is a drug classification system. The purpose

of this system is a tool for medicinal research to improve the quality of drug administration (4). In this system drugs are grouped based on the pharmacological, chemical and treatment properties. Defined Daily Dose (DDD) is a measuring instrument of consumption. DDD is the average daily dose of a drug which used for its main indication in adults. When this criterion is used for inpatient, the unit of "DDD per 100 bed days" is applied, that represent to medicines consumption per 100 active bed-days (3 and 5). The unit could provide an overall estimate of the medicines consumption that is calculated in the following way:

$$\text{DDD per 100 bed-days} = \frac{\text{amount of the drug consumption based on DDD} \times 100}{\text{Bed occupancy index} \times \text{number of hospital beds} \times \text{time (days)}}$$
$$\text{Bed occupancy index} = \frac{\text{Bed occupied days} \times 100}{\text{active Beds} \times \text{number of days in that period}}$$

First, the data collection forms designed and then after coordination with hospital and archival officials, files of all patients admitted from April 2011 to March 2012, one year, were evaluated for received antibiotics. For analysis recorded data using SPSS version 13 and for comparison of quantitative values the independent t test and for

qualitative values the chi square test was used

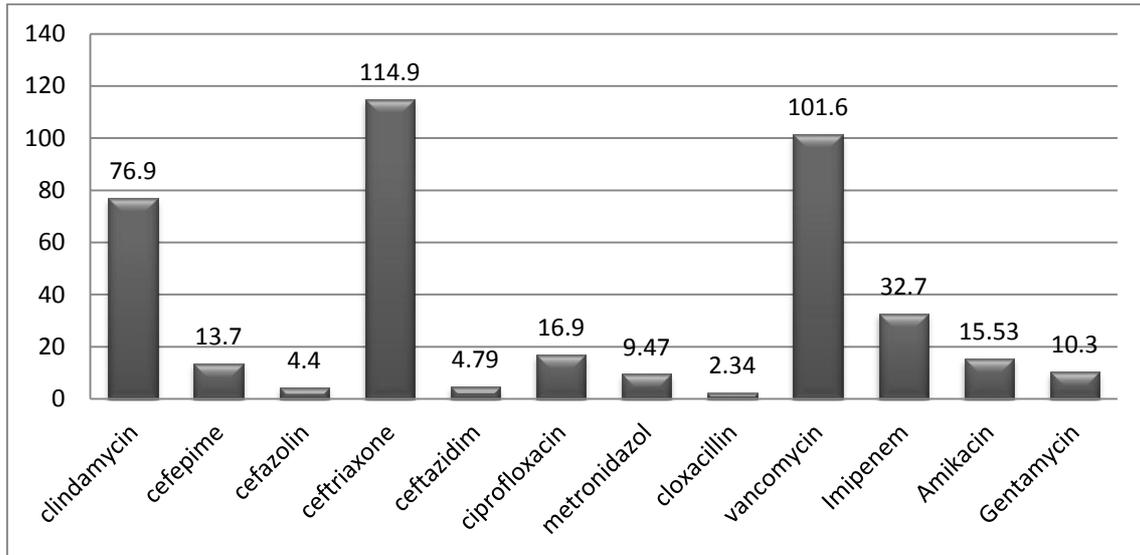
### Results

Fatima Zahra hospital is the heart and heart surgery center of the Mazandaran province at north of Iran and had 8564 hospitalized patients in that duration, one year and bed occupancy index was 0.91%. During this period, 1182 patients (21.26%) received antibiotics. Antibiotic was prescribed in 1467 patients (80.5%) as prophylaxis before surgery, and 355 patients (19.5%) had received therapeutic antibiotics. 196 patients (55.2%) were men and 180 patients (44.8%) were female. Average age of  $62.1 \pm 16.1$  years old (range 0.5 to 96) was calculated. There was no significant difference for use of antibiotics between both sexes and age groups ( $p = 0.031$ ,  $p = 0.5$  respectively). The most common diseases for administered antibiotics were pneumonia (45.6%), surgical wound infection (16.3%), endocarditis (15.2%), urinary tract infection (6.8%), and sepsis (6.8%), respectively. The most common underlying diseases were diabetes mellitus (57.6%), chronic pulmonary disease (8.5%) and renal failure (6.8%), respectively. Cost of antibiotics was 15.14% of total hospital drugs cost in that year. The mean

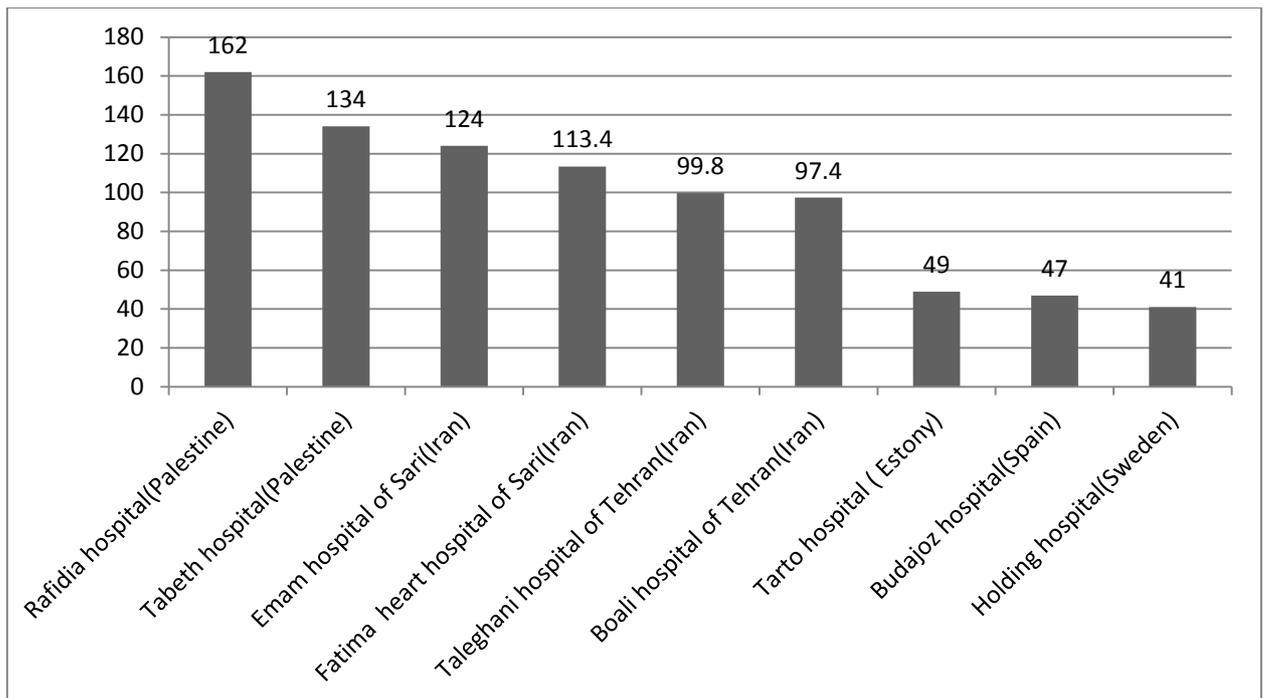
duration of antibiotic use in patients was  $11.54 \pm 5.69$  days (range of 6-32). Antibiotics were prescribed as intravenous in 93.34% of cases, and in 6.7 percent were administered orally. Ceftriaxone was the most common drug used in 233 patients (65.6%) and most common indications for the use were pneumonia (59.7%), endocarditis (16.7%), sepsis (6.9%), urinary tract infection and wound infection (each 6%), respectively. The second prescribed antibiotic was vancomycin used in 194 patients (54.6%). The main indications for the use of vancomycin were pneumonia (29.8%), surgical wound infection (26.8%), endocarditis (21.6%), mediastinitis (6.8%) and sepsis (6.3%), respectively. Clindamycin was administered in 127 patients (35.8%) and the most important reasons to prescribe were pneumonia (69.3%), wound infection (13%) and sepsis (13%), respectively. Imipenem was used in 76 patients (21.4%) for the treatment of pneumonia (56.6%), wound infection (19.7%) and sepsis (5.3%), respectively. Other antibiotics were such as azithromycin (in 15.8% of patients), amikacin (11.8%), cefepime (7.9%), ampicillin sulbactam (5.1%)

and Gentamycin (5.1%). Most antibiotics used to treat pneumonia were, including ceftriaxone (85.8%), clindamycin (54.3%), ciprofloxacin (42%), vancomycin (34%) and azithromycin (28.4%), respectively. Vancomycin in the 87.9% of patients was prescribed for wound infection. Also most antibiotics used to treat in patients with endocarditis, were including vancomycin (75.9%), ciprofloxacin (33.3%), amikacin (33.3%), gentamicin (24.1%) and ampicillin sulbactam (22.2%). The defined daily dose of antibiotics used in all was 403.5 and for ceftriaxone and vancomycin was 114.9 and 101.6, respectively (Figure 1).

Generally, 5 antibiotics include ceftriaxone, vancomycin, clindamycin, imipenem and ciprofloxacin were prescribed in 90% of all antibiotic administrations. Based on the unit of "DDD per 100 bed days" amount of antibiotics consumption was 113.4, (Figure2).



**Figure 1** - The rate of antibiotics consumption (defined daily dose) in the Sari heart Hospital in one year.



**Figure 2** - Comparison of antibiotics consumption (based on defined daily dose per 100 bed days) in the heart Hospital of Sari with other hospitals

### Discussion

This cross-sectional study was performed to investigation of antibiotics

prescription in medical and surgical wards of a university hospital. Cost of antibiotics was 15.14% of total hospital drugs cost at duration of the study, it seems plausible in comparison to other studies. In a study was conducted in hospitals of Taleghani and Buali of Tehran, cost of antibiotics were included 25% and 19.4% of total drug costs, respectively (3 and 6). We should bear in mind that cardiology and heart surgery specialized hospitals consume of drugs which are relatively expensive and would be considered at the next review. In our study antibiotic consumption based on unit of "DDD per 100 bed days" was 113.2. This value was acceptable in comparison with similar studies in the country and the region. Such that in Imam hospital of Sari and in hospitals of Taleghani and Buali of Tehran the amount have been reported 124, 99.8 and 97.4, respectively (3, 6 and 7). However, in studies conducted in European countries, this rate was much lower and much less than 50 (8, 15). Therefore, use of modeling of these countries in antibiotic consumption patterns would

be useful. Ceftriaxone was the most common prescribed antibiotic in our

study, in 65.6% of patients. The same results have been reported in many of studies in our country and even in other same regions (3, 6, 7 and 9). Due to high consumption of ceftriaxone in hospitals and even outpatient prescription of them, the risk of side effects and possibility of drug resistance has dramatically increased. Hence, considering indications for ceftriaxone in the hospital (pneumonia, endocarditis, sepsis, urinary tract infection, and wound infection) "Mix Therapy Strategy" can be considered. The mix therapy is the use of different antibiotics but the same effect on pathogenic organisms in different patients (e.g., in a patient with community acquired pneumonia use of ceftriaxone and in another patient with the same disease use of ampicillin-sulbactam) (16). This strategy has been emphasized in recent guideline of the monitoring antibiotic use (10). And also any other cephalosporin or even other classes of antibiotics to prevention of these complications can be considered. Vancomycin was the second most common prescribed antibiotic in this study, in 194 patients (54.6%). Due to the importance of this antibiotic in the treatment of many life-threatening diseases caused by Enterococci and

Staphylococci and etcetera, reducing of vancomycin consumption is the main objectives of controlling nosocomial infections and monitoring of antibiotic use. Take the indications for using of vancomycin in this study shows that in many cases could be replaced with drugs such as clindamycin, cotrimoxazole, ampicillin-sulbactam, tazosin and etc. but due to lack of information on organisms cause the disease and their antibiotic susceptibility have not used. This problem about other invaluable antibiotics, such as imipenem and ciprofloxacin exist, that in all cases the use of effective methods to monitoring antibiotic use such as antibiotics rotation is helpful. On the other hand, antibiotic consumption can lead to propelled to antibiotic cheaper, Simpler, and with more limited range with improve of microbial cultivation (appropriate sampling, transport of samples to lab and correct cultivation techniques) (17).

### Conclusion

Despite the relatively good use of antibiotics in our hospital, the use of essential drugs, vancomycin and imipenem was high. This is partly due to type of our patient's disease (heart

surgery) and partly due to lack of sufficient knowledge about common objects antibiotic resistance in hospitals. Thus, scientific, accurate and acceptable studies in this context would be helpful.

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