

Evaluation of antibiotic use pattern in Shahid Sadoughi hospital of Yazd

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Abstract

Antibiotics are a class of drugs that are widely used to eliminate the causes of many infectious diseases around the world. It should be borne in mind that their irrational and irregular administration will increase bacterial resistance and dangerous complications. For this reason, timely diagnosis and usage of antibiotics is one of the tasks of physicians to improve the patient's use of the lowest number of antibiotics. This was a retrospective descriptive cross-sectional study. The samples were selected by non-random sampling from all records of patients admitted to Shahid Sadoughi Hospital of Yazd from HIS hospital system with total number of 82742. The type of hospital admission, the type of prescription, the cause of antibiotic prescription, the cost of antibiotic use was entered into the questionnaire. The most commonly used antibiotics were cefazolin with a frequency of 18.41%, clindamycin with a frequency of 17.49%, ceftriaxone with a frequency of 15.48% and vancomycin with a frequency of 10.18% and metronidazole with a frequency of 7%, respectively. The most costly antibiotics were meropenem (14.28% of costs), vancomycin (13.4%), and amphotericin (10.09%). The pattern of antibiotic use in hospitals should be more carefully considered and given the cost and burden of unnecessary antibiotic use, serious consideration should be given to antibiotic use.

Keywords: Antibiotic, Consumption pattern, Yazd, Hospital.

INTRODUCTION

The discovery of antibiotics in the early twentieth century revolutionized medical science, extending the life and health of patients, especially those undergoing surgery, immunocompromised patients, and transplant recipients but in recent years, the indiscriminate and unjustified use of antibiotics has not only imposed high costs on the country's healthcare system, but has also led to the gradual resistance of microbes to antibiotics [1, 2].

Due to this problem, one of the most important and effective drugs in the risk of ineffectiveness and uselessness for patients are due to the resistance of microbes. Following the increase in resistance, the prevalence of current infectious diseases and the incidence of emerging diseases increase and lead to an increase in mortality, and also the treatment of the disease become more difficult and the costs of treatment increase [3].

Accordingly, the World Health Organization (WHO) has identified antibiotic resistance due to over-consumption and unscientific use as one of the three most important factors threatening human health in the 21st century [4].

In our country, due to the lack of adequate supervision and the possibility of providing antibiotics without a doctor's prescription in pharmacies and the lack of adequate training on the dangers of excessive consumption, antibiotics are among the best-selling drugs purchased by patients as until 2011, four drugs, amoxicillin, penicillin, metronidazole and cefixime, were among the top ten best-selling drugs in Iran [5-7].

The most important thing after culture building and educating patients about not taking antibiotics arbitrarily, checking the prescriptions of doctors and knowing the amount of antibiotics prescribed in the centers, the cost of prescribing antibiotics, the amount of consumption of each different antibiotic groups, the

reason for prescribing antibiotics is to know the distribution of antibiotics in different parts of the hospital and finally to know the specialty of the doctor who prescribes antibiotics [8-10]. This is very important because without sufficient knowledge and expertise, a large number of patients are treated annually without antibiotic indications [11].

Due to the issues raised and the importance of antibiotic consumption pattern in hospitals, the aim of the present study was to investigate the antibiotic consumption pattern in different wards of Shahid Sadoughi Hospital in Yazd in 2017.

MATERIALS AND METHODS

This study was a descriptive-cross-sectional study of the retrospective type and without any intervention in the current situation of the subjects, data collection was performed. The ethics committee of Shahid Sadoughi University of Medical Sciences confirmed this study.

The drug information of all patients who were hospitalized in Shahid Sadoughi Hospital in Yazd in 2017 was examined in the HIS system of the hospital.

The criteria for entering the study included: hospitalization in Shahid Sadoughi Hospital and the availability of case information in HIS, and the unavailability of case information in HIS was the criterion for exit from the study.

A total of 82,742 cases were reviewed from all hospitalized patients. The research questionnaire was based on case reading. This questionnaire included the parameters of the type of hospital ward, the type of prescription and the cost of antibiotics.

Statistical analysis

Version 22 of the SPSS software was used for statistical analysis of the data. The results were expressed for quantitative variables as mean and standard deviation (Mean \pm SD) and for qualitative class variables as percentage. To compare the two-dimensional (dichotomous) dependent variables was used logistic regression and also to evaluate the relationship between the qualitative variables were used the Chi-Square and Fisher's Exact tests. Significant levels were considered less than 0.05.

RESULTS

The highest antibiotic administration in the ICU with a total number of 61852 consumables out of a total of 296937 units and a frequency distribution of 20%, internal with a total consumption number of 37744 and a frequency distribution of 12%, Surgery with a total consumption of 35238 and a frequency distribution of 11% and obstetrics with a total consumption of 29687 and a frequency distribution of 9% and a minimum antibiotic prescription in the operating room of Shahid Sadoughi Hospital with a total consumption of 1147 and a frequency distribution of 0.3%.

Also, the highest cost of antibiotics is in the ICU, internal medicine, infectious and pediatric wards, respectively, and the lowest cost is related to the operating room ward of Shahid Sadoughi Hospital in Yazd.

In general, the most common type of antibiotic prescription in Shahid Sadoughi Hospital is injectable (92%), then tablets (5%), capsules, and finally syrup.

The most commonly used antibiotics are cefazolin with a

frequency distribution of 18.41%, clindamycin with 17.49%, ceftriaxone with a frequency distribution of 15.48%, vancomycin with a frequency distribution of 10.18% and metronidazole with a frequency distribution of 7%. Also, the lowest drug prescription was related to azithromycin and afloxacin with a frequency distribution of 0.1%. The total numbers of prescribed antibiotics were 296937.

Finally, the most expensive antibiotics are meropenem (14.28%), vancomycin (13.4%), amphotericin (10.09%), clindamycin (9.09%) and cefazolin (8.7%), respectively.

DISCUSSION

According to the present study, the highest dose of hospital antibiotics in Yazd in the ICU with a total consumption of 61852 out of a total of 296937 units and a frequency distribution of 20% and the internal part with a total consumption of 37744 and a frequency of 12% which was similar to the result of Ebrahimzadeh's study [12].

The highest cost of antibiotics was in the ICU, internal medicine, infectious diseases and pediatrics, respectively and the lowest costs were related to the operating room ward of Shahid Sadoughi Hospital in Yazd. Also, the most common type of antibiotic prescription in Shahid Sadoughi Hospital is by injection (92%), then tablets (5%), capsules, and finally syrup which was consistent with Hajebi's study [13].

According to the results of the present study, the most commonly used antibiotics are cefazolin, clindamycin, ceftriaxone, vancomycin and metronidazole, respectively. Also, according to the results of the present study, the most expensive antibiotics were meropenem, vancomycin, amphotericin, clindamycin and cefazolin, respectively which among them, amphotericin, despite the low frequency of consumption, will leave a lot of financial burden. This result was also consistent with Hajebi's study [13].

CONCLUSION

The pattern of antibiotic use in hospitals needs to be further explored, and due to the costs and burdens of unreasonable antibiotic use, a serious overhaul of antibiotics should be considered.

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Conflict of Interest

We declare that we have no conflict of interest.

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REFERENCES

1. Andersson DI. Persistence of antibiotic resistant bacteria. *Curr Opin Microbiol.* 2003;6(5):452-6.
2. Tacconelli E, Carrara E, Savoldi A, Harbarth S, Mendelson M, Monnet DL, et al. Discovery, research, and development of new antibiotics: the WHO priority list of antibiotic-resistant bacteria and tuberculosis. *The Lancet Infectious Diseases.* 2018;18(3):318-27.
3. Cars O, Högberg LD, Murray M, Nordberg O, Sivaraman S, Lundborg CS, et al. Meeting the challenge of antibiotic

- resistance. *BMJ*. 2008;337:a1438.
4. Cassini A, Högberg LD, Plachouras D, Quattrocchi A, Hoxha A, Simonsen GS, et al. Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European Economic Area in 2015: a population-level modelling analysis. *The Lancet Infectious Diseases*. 2019;19(1):56-66.
 5. Jafari A, Majidpour A, Safarkar R, Noor-Allahi M, Arastoo S. The Synthesis and Characterizes of Nano-Metallic Particles Against Antibiotic Resistant Bacteria, Isolated from Rasoul-e-Akram Hospital's Patients, Tehran, Iran. *Journal of Molecular Biology Research*. 2016;6(1):80.
 6. Salehi TZ, Bonab SF. Antibiotics susceptibility pattern of *Escherichia coli* strains isolated from chickens with colisepticemia in Tabriz province, Iran. *International Journal of Poultry Science*. 2006;5(7):677-84.
 7. Khosravi AD, Hoveizavi H, Farshadzadeh Z. The prevalence of genes encoding leukocidins in *Staphylococcus aureus* strains resistant and sensitive to methicillin isolated from burn patients in Taleghani Hospital, Ahvaz, Iran. *Burns*. 2012;38(2):247-51.
 8. Behzadnia S, Davoudi A, Rezai MS, Ahangarkani F. Nosocomial infections in pediatric population and antibiotic resistance of the causative organisms in north of Iran. *Iranian Red Crescent Medical Journal*. 2014;16 (2).
 9. Schwartz T, Kohnen W, Jansen B, Obst U. Detection of antibiotic-resistant bacteria and their resistance genes in wastewater, surface water, and drinking water biofilms. *FEMS microbiology ecology*. 2003;43(3):325-35.
 10. Munir M, Wong K, Xagorarakis I. Release of antibiotic resistant bacteria and genes in the effluent and biosolids of five wastewater utilities in Michigan. *Water research*. 2011;45(2):681-93.
 11. Khoshbakht R, Salimi A, SHIRZAD AH, Keshavarzi H. Antibiotic susceptibility of bacterial strains isolated from urinary tract infections in Karaj, Iran. 2013;5:25-31.
 12. Ebrahimzadeh M, Ansari F, Ramezani A, Shokrzadeh M, Shabankhani B, Saeedi S, et al. Utilization Pattern of Antibiotics in Different Wards of Sari Imam Khomeini Teaching Hospital. *Journal of Mazandaran University of Medical Sciences*. 2007;17(61):166-9.
 13. Hajebi G, Mortazai S, Goudarzi J. A survey of consumption pattern of antibiotics in Taleghani Hospital. 2005;18:24-27.