

Examining the Consumption Pattern of three Expensive Antibiotics (Meropenem, Ciprofloxacin and Cefepime) in Shahid Beheshti Hospital, Hamedan

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Abstract

Introduction: The aim of this study was to investigate the consumption pattern of three expensive antibiotics (meropenem, ciprofloxacin and cefepime) in Shahid Beheshti Hospital, Hamedan.

Method: In a retrospective cross-sectional study, all patients who were admitted to Shahid Beheshti Hospital in Hamedan, Iran, in the first 6 months of 2019 as the period before the epidemic and the first 6 months of 2021 as the period during the epidemic and after hospitalization, meropenem, ciprofloxacin and cefepime were prescribed to them, they entered the study. Data were analyzed using SPSS software.

Result: The drug prescribed for the patients were meropenem in 213 (35.2%) patients, cefepime in 270 (34.2%) and ciprofloxacin in 187 (30.6%) patients. The microorganism was correct in 2.5% of cases, 10.9% was wrong and 86.6% was not tested. The site of infection for the patients were bacteremia in 2 (0.3%) patients, coronary artery catheter in 3 (0.5%) patients, kidney and bladder in 14 (2.3%) patients, and skin and soft tissue in 1 (0.2%) patient.

Conclusion: Based on the results of the study, for most cases receiving three expensive antibiotics (meropenem, ciprofloxacin, and cefepime) in Shahid Beheshti Hospital in Hamedan, before and during the covid-19 epidemic, it is not possible to judge if the prescription has been rational or not.

Key words: antibiotic; covid 19; hamadan

Introduction

Antibiotic is generally a product or substance that is produced or taken from a microorganism and kills other microorganisms or prevents their growth [1-3]. Different types of antibiotics are different in terms of chemical, physical, pharmacological properties, antimicrobial scope and mechanism of action [4-5].

Broad-spectrum antibiotics are those that are active against different types of microorganisms. Like tetracycline, which is effective against many gram-positive bacteria, chlamydia, mycoplasma, and rickettsia. Antibiotics with a limited range are those that are active against only one microbe or a very limited range of microbes; such as vancomycin, which is mostly used against gram-positive cocci such as staphylococci and enterococci [6-7].

The World Health Organization recently warned against antibiotic resistance worldwide and declared the practice of prescribing and overusing antibiotics as one of the biggest threats to public health in the world. After this warning, many countries began to educate and improve the understanding of the medical community and people in this field with advertisements and media training on various television channels [8-9].

Statistics show that in Tehran, the capital city of Iran, 40-50% of outpatient prescriptions include antibiotics, while according to the World Health Organization, the standard of antibiotics in prescriptions should be less than 20%. Therefore, it seems that we are facing the problem of irrational prescribing of antibiotics [10-12].

The indiscriminate prescription of new and expensive antibiotics, in addition to imposing costs on the patient and the country's healthcare system, causes the emergence of antibiotic resistance at the community level, which in turn creates many problems in the treatment of infectious and contagious diseases in the future (13-14). Antibiotic misuse and over-prescription not only can lead substantial economic burden on patients and health systems, also may complicate the treatment of patients and increase the likelihood of microbial resistance [16-15].

There is a dearth of information on hospital antibiotic usage, particularly in countries without well-established antimicrobial stewardship programs [15-17]. In addition, data reveal that nations with a high frequency of COVID-19 infection have a substantial rank in the occurrence of multi-drug resistant infections, indicating that this pandemic is happening under critical circumstances of microbial resistance [18]. In order to reduce the harmful effects of overuse, antibiotics should be used responsibly [19]. Information about the antibiotics used by hospitalized patients assists in the development of programs to regulate antibiotic usage (17). Considering the explained issues, the present research was conducted to study the consumption of the injectable form of three antibiotics, meropenem, ciprofloxacin, and cefepime at Shahid Beheshti Hospital in Hamedan.

Materials and Methods

Shahid Beheshti Hospital in Hamadan served as the subject of this retrospective and cross-sectional research.

The target population included patients admitted to Shahid Beheshti Hospital in Hamedan in the first 6 months of 2018- as the period before the epidemic- and the first 6 months of 2014- as the period during the

epidemic- who injectable forms of meropenem, ciprofloxacin or cefepime were prescribed for them. Sampling was done in such a way that at least 100 cases were included in the study for each period before and after Corona for each antibiotic; where the total number of patients for one antibiotic was less than 100 in each of the two mentioned periods, the census was used.

The required data were extracted from the patients' files. The investigated parameters included:

demographic information (age, gender), underlying disease, WBC blood cell count, conduction of microbial culture, antibiotic sensitivity, drug dose, duration of treatment, presence or absence of fever, specialty of the prescribing physician, and indication of prescription.

Data were analyzed by using SPSS. 16 software. Quantitative variables were reported as mean and standard deviation, and qualitative ones were reported as frequency (percentage).

Result

In total, 605 files were studied; 297 out of them were selected among patients admitted during the first 6 months of 2018 (as the period before the epidemic of covid-19) and 308 patients were selected from the cases belonged to the first 6 months of 2014 (as the period during the epidemic).

The antibiotic prescribed for 213 (35.2%) patients was meropenem, for 270 cases (34.2%) was cefepime, and for 187 ones (30.6%) was ciprofloxacin. The microorganism was correct in 2.5% of patients, for 10.9% of the cases was wrong and 86.6% of the cases were no tested.

The site of infection was not recorded for most patients. More details can be found in table 1.

site of infection	Frequency	Percent
No	585	96.7
Bacteremia	2	0.3
Coronary artery catheter	3	0.5
Kidney and bladder	14	2.3
Skin and soft tissue	1	0.2

Table 1: The frequency of site of infection for the patients

In the case of 31.6% of cases, prescribing physician's specialty major was infectious diseases (Table 2).

Specialist doctor	Frequency	Percent
No	9	1.5
Infectious	191	31.6
Others	405	66.9

Table 2: The frequency of specialist doctor for patients

No significant relationship was observed between microorganism and the prescribed antibiotic in the 2 studied time periods ($P > 0.05$) (Table 3).

time period	prescription drug	Microorganism			P Value
		No test	Correct	Wrong	
2019	meropenem	98 (81.7%)	3 (2.5%)	19 (15.8%)	0.095
	cefepime	88 (89.7%)	4 (4.1%)	6 (6.1%)	
	ciprofloxacin	75 (94.9%)	1 (1.3%)	3 (3.8%)	
2021	meropenem	79 (87.9%)	4 (2.7%)	10 (9.4%)	0.12
	cefepime	96 (88.1%)	3 (2.8%)	10 (9.2%)	
	ciprofloxacin	88 (83%)	0 (0%)	18 (17%)	

Table 3: Relationship between microorganism and patients' prescription drugs in the 2 studied time periods

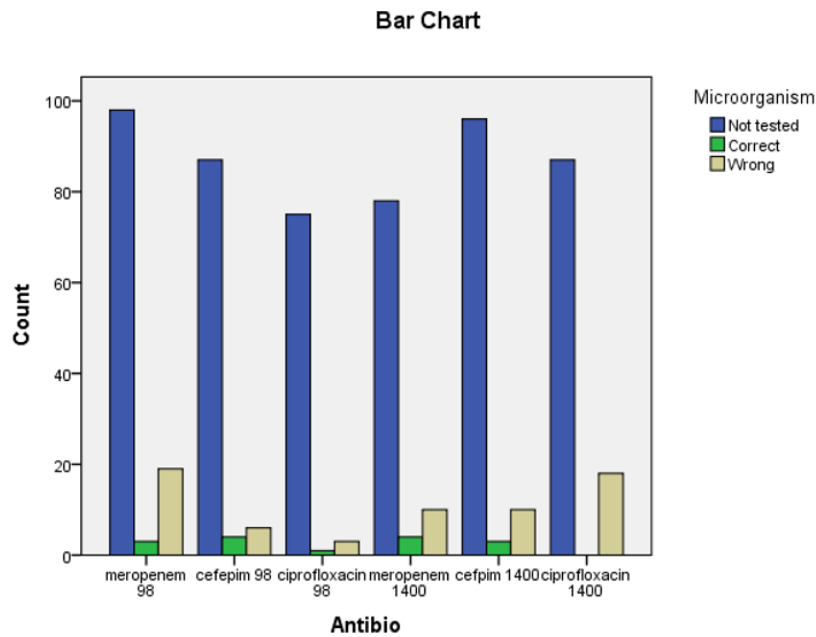


Figure 1: Conformity of the prescribed antibiotic with the identified microorganism in the 2 studied time periods

A significant relationship was observed between doctors' specialty and prescribed antibiotic in the 2 studied time periods ($P < 0.05$) (Table 4).

time period	prescription drug	Specialist doctor			P_Value
		No	Infectious	Others	
2019	meropenem	3 (2.5%)	29 (24.2%)	88 (73.3%)	<0.001
	cefepime	0 (0%)	59 (60.2%)	39 (39.8%)	
	ciprofloxacin	1 (1.3%)	12 (15.2%)	66 (83.5%)	
2021	meropenem	3 (1.4%)	57 (26.8%)	153 (71.8%)	<0.001
	cefepime	1 (0.5%)	97 (46.9%)	109 (52.7%)	
	ciprofloxacin	5 (2.7%)	37 (19.4%)	143 (77.3%)	

Table 4: Relationship between doctors' specialty and prescribed antibiotic in the 2 studied timeperiods

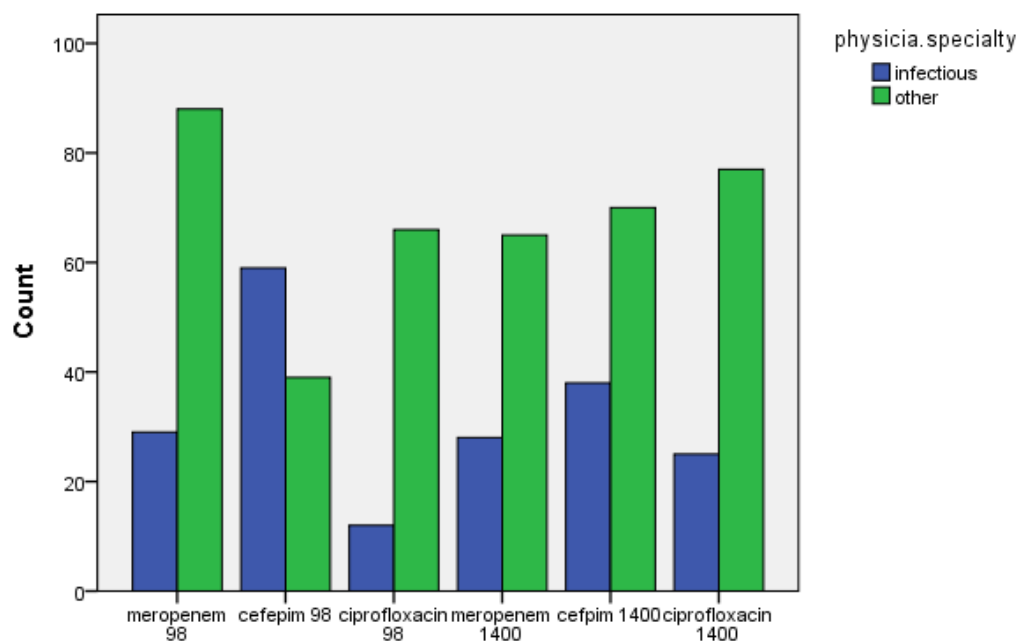


Figure 2: Frequency of prescription drugs based on specialist doctors in the 2 studied time periods

Discussion

The present research addressed the pattern of use of three expensive antibiotics (meropenem, ciprofloxacin, and cefepime) before and during the COVID-19 epidemic in Shahid Beheshti Hospital in Hamadan. According to a review of the literature, no previous research has studied this topic.

Based on the results of the study, it seems that in Shahid Beheshti Hospital in Hamedan, three expensive antibiotics (meropenem, ciprofloxacin, and cefepime) were widely used without any record on antibiogram test, which probably means that antibiogram test has not been performed. Several prior investigations reported that meropenem, ciprofloxacin, and cefepime have been used in large quantities [20-25]. For instance, Molla et al. (2021) found that 133 patients (68.91%) had received numerous antibiotics. Patients with serious illnesses often got more antibiotics. Ceftriaxone (53.8%), meropenem (40.9%), moxifloxacin (29.5%), and doxycycline (25.4%) were the four antibiotics administered among the patients undergoing the examination; the authors came to the conclusion that patients with severe illness and those who had abnormal CRP and d-dimer values had a greater incidence of numerous antibiotic prescriptions. However, there was no data about the effectiveness of antibiotic administration [17].

In accordance with the findings of the current study, Bojana Beovic et al. (2020) in an investigation on the antibiotic prescription in patients with COVID-19 reported that the most significant justification for initiating antibiotics was clinical symptoms [22].

According to Liyang Wang and his colleagues' (2020) findings, which are in line with the findings of the current investigation, the majority of the patients had received antibiotic treatment experimentally, and just 2.7% of cases (n=37) had serious co-infections. This paper demonstrates that while paying attention to inflammatory variables may be beneficial for the experimental administration of these medications, experimental antibiotic therapy may not be required for all individuals [24].

In accordance with the findings of the current investigation, Alvaro Goncalves Mendes Neto et al. (2020) revealed that the administration of antibiotics to patients was documented in 67% of cases, and in 72% of those, no evident bacterial infection cause was noted [25].

Conclusion

Based on the results of the study, for most cases receiving three expensive antibiotics (meropenem, ciprofloxacin, and cefepime) in Shahid Beheshti Hospital in Hamedan, before and during the covid-19 epidemic, it is not possible to judge if the prescription has been rational or not. Therefore, improvement in antibiotic stewardship seems needed.

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Conflicts of interest:

The authors declare that they have no conflicts of interest

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