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THE STATE OF ANTIBIOTIC USE AT SHYMKENT CITY CLINICAL HOSPITAL 1

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Abstract. In medical practice, monitoring the effectiveness of antibiotics and the susceptibility of pathogens plays an important role. According to the recommendations of the World Health Organization, controlling the efficacy and safety of antibacterial therapy can reduce infection resistance. Studying the patterns of antibiotic use in a hospital that provides emergency and planned specialized medical care is of both scientific and practical interest.

Aim of the study: To examine cases of antibacterial therapy prescriptions in the clinic and to assess the state of antibacterial therapy based on the results of a cross-sectional (point-prevalence) study.

Materials and methods: The study of antibacterial prescriptions was conducted in the clinical departments of City Clinical Hospital No. 1 in Shymkent. All medical records of patients receiving treatment at the time of the study were analyzed. A cross-sectional epidemiological method was used to assess the effectiveness of antibacterial therapy.

Results and conclusions: The prevalence of antibacterial therapy in the hospital in our study was 91.9%. Most patients (75%) received one antibiotic during treatment. The proportion of patients who were prescribed two antibacterial drugs was 17.6% of all patients receiving antibacterial therapy, while the combined proportion of those prescribed three or more antibiotics was 7.4%. Cephalosporins were used as initial antibacterial therapy in 81% of cases, and in 72.0% of these cases the effectiveness of the drugs was sufficient. Cefazolin and Ceftriaxone, which were used as the main antibiotics in postoperative patients, demonstrated effectiveness rates of 81% and 66.4%, respectively. The low effectiveness of ceftriaxone observed in our study highlights the need for enhanced monitoring of this antibiotic.

Keywords: antibacterial therapy; cross-sectional point-prevalence study; effectiveness of cephalosporins; cefazolin; ceftriaxone.

Шымкент қаласының №1 қалалық клиникалық аруханасындағы антибиотиктерді қолданудың жағдайы

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Андатпа. Медициналық тәжірибеде антибиотиктердің тиімділігін және ауру қоздырғыштардың сезімталдығын бақылау маңызды орын алады. Дүниежүзілік денсаулық

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сақтау ұйымының (ДДҰ) ұсынымдарына сәйкес, антибактериалдық терапияның тиімділігі мен қауіпсіздігін бақылау арқылы инфекциялардың резистенттілігін төмендетуге мүмкіндік береді.

Мақсаты: Клиникадағы антибактериалдық терапия тағайындау жағдайларын зерттеу және антибактериалдық терапияның жағдайына көлденең (бірсәттік) әдісінің нәтижелері негізінде баға беру.

Зерттеу материалдары мен әдістері: Антибактериалдық тағайындаулардың жай-күйін зерттеу Шымкент қаласының №1 Қалалық клиникалық ауруханасының клиникалық бөлімшелерінде жүргізілді. Ем қабылдап жатқан барлық науқастардың медициналық карталары бір мезетте талдауға алынды. Антибактериалдық терапияның тиімділігін бағалауында эпидемиологиялық зерттеудің бір сәттік көлденең зерттеу әдісі қолданылды.

Нәтижелері мен қорытындылары: Антибактериалдық терапияның таралуы біздің зерттеуімізде 91,9% құрады. Науқастардың басым бөлігі (75%) емдеу барысында бір антибиотик қабылдаған, екі антибактериалдық препарат антибактериалдық ем алған барлық науқастардың 17,6%-ын құрады, ал үш және одан да көп антибиотик тағайындалған науқастардың жиынтық үлес салмағы 7,4% болды. Стартық антибактериалдық терапия ретінде 81% жағдайда цефалоспориндер тағайындалған, және олардың жалпы тиімділігі 72,0% жағдайларда байқалды. Операциядан кейінгі науқастарда негізгі антибиотиктер ретінде қолданған Цефазолин мен Цефтриаксонның тиімділігі 81% мен 66,4% болды. Клиникадағы антибактериалдық терапияның жай-күйін бағалау үшін көлденең зерттеу аясында цефтриаксонның тиімділігі төмен екендігі және бұл препаратты бақылау қажет екендігін көрсетті.

Түйін сөздер: антибактериалді терапия, бір сәттік көлденең зерттеу, цефалоспориндердің тиімділігі, цефазолин, цефтриаксон.

Состояние антибактериальной терапии в городской клинической больнице № 1 г. Шымкент

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Аннотация. В медицинской практике важное место занимает контроль эффективности антибиотиков и чувствительности возбудителей болезней. Согласно рекомендациям Всемирной организации здравоохранения, контролируя эффективность и безопасность антибактериальной терапии, можно снизить резистентность инфекций. Изучение практики применения антибиотиков в больнице, оказывающей экстренную и плановую специализированную медицинскую помощь, вызывает научный и практический интерес.

Цель исследования: Изучить случаи назначения антибактериальной терапии в клинике и дать оценку состояния антибактериальной терапии на основании результатов поперечного (одномоментного) метода исследования.

Материалы и методы исследования: Исследование антибактериальных назначений проведены на базе клинических отделений Городской клинической больницы №1 города Шымкент. Были проанализированы все медицинские карты больных, получающих лечение на

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момент исследования. Для оценки эффективности антибактериальной терапии использовался поперечный метод эпидемиологического исследования.

Результаты и выводы: Распространенность антибактериальной терапии в больнице в нашем исследовании составила 91,9%. Большинство пациентов (75%) получали в ходе лечения один антибиотик. Удельный вес пациентов, которым назначены два антибактериальных препарата составил 17,6% от всех пациентов, получавших антибактериальное лечение, а совокупный удельный вес пациентов, которым были назначены три и более антибиотика, составил 7,4%. В качестве стартовой антибактериальной терапии цефалоспорины применялись в 81% случаев, при этом в 72,0% случаев эффективность препаратов была достаточной. Цефазолин и Цефтриаксон, которые использовались в качестве основных антибиотиков у послеоперационных пациентов, имели эффективность 81% и 66,4% соответственно. Низкие значения эффективности цефтриаксона в антибактериальной терапии в клинике в нашем исследовании показывают о необходимости контроля этого препарата.

Ключевые слова: антибактериальная терапия; поперечное одномоментное исследование; эффективность цефалоспоринов; цефазолин; цефтриаксон.

Introduction

Issues of antibiotic resistance are among the current pressing areas of both theoretical and practical medicine and hold significant importance in the healthcare system as well as in society [1,2].

In clinical practice, the widespread prescription of antibacterial therapy, insufficient monitoring of antibiotic effectiveness and safety, as well as the lack of standardized protocols for antibiotic use, are considered among the main factors contributing to the emergence of multidrug-resistant bacterial strains [3,4,5].

To monitor the spread of antimicrobial-resistant forms of microorganisms (pathogens), internationally recognized tools for rational antibiotic use, such as the AWaRe and AMS programs, are being implemented in clinical settings [6,7].

According to the recommendations of the World Health Organization (WHO), classifying antibiotics within the AWaRe system into “Access,” “Watch,” and “Reserve” groups allows for better monitoring of the effectiveness and safety of antibacterial therapy, as well as helps reduce the development of antimicrobial resistance.

The successful implementation of the AMS program in clinical institutions, and its widespread adoption across all healthcare organizations, contributes to the rational use of antibacterial agents, timely identification of hospital-acquired resistant infections, and the prevention of their development [7].

Studying the current state of antibacterial therapy in the healthcare system, as well as the experience before and after the implementation of a monitoring program, is of particular scientific interest [8,9].

Materials and research methods

The search for research methods capable of providing an objective and comprehensive assessment of antibacterial therapy, while requiring minimal time and resources, is of both theoretical and practical importance [10].

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To rapidly assess the state of antibacterial therapy, a cross-sectional (one-time) study design is used, which allows for capturing the situation at a specific point in time without taking into account the many factors that may influence the infection treatment process [11].

During the monitoring of antibacterial therapy, the cross-sectional study design allows for the assessment of the current state of therapy, analysis of the effectiveness and safety of drugs, and timely adjustments to prescribing practices to prevent the development of antibiotic resistance.

A prospective (longitudinal) study is a long-term monitoring method in which the expected outcomes have not yet occurred at the start of the study. This approach allows for the evaluation of the rationality of antibacterial therapy practices, as well as the assessment of drug effectiveness and safety [12].

A cross-sectional study is an epidemiological study design in which participants are examined only once, and information (in this case, the criteria and data for prescribing antibacterial therapy to patients) is collected at a single point in time.

In large scientific projects, cross-sectional studies are typically conducted at the initial stage of the research. Their purpose is to obtain preliminary data on the prevalence of the issue under investigation and to formulate scientific hypotheses that serve as a basis for subsequent in-depth studies and complex statistical analyses [13,14].

Despite some limitations of this method, its main advantage lies in the ability to assess the state of antibacterial therapy practices in a clinical setting.

The study of the state of antibacterial prescriptions was conducted in the clinical departments of Shymkent City Clinical Hospital No. 1.

Shymkent City Clinical Hospital No. 1 is a multidisciplinary medical institution providing both emergency and planned specialized care in surgical, trauma, urological, neurosurgical, gynecological, neurological, and therapeutic fields.

According to the data from the Medical Information System (MIS), during the study period from October 20 to 23, 2025, the medical records of all patients receiving treatment at the hospital were analyzed.

Objective of the study: To investigate the patterns of antibacterial therapy prescription in the clinic and to assess the current state of antibacterial therapy.

To achieve this objective, the following tasks were set:

1. To investigate the patterns of antibacterial therapy prescription;
2. To analyze the use of cefazolin and ceftriaxone in both monotherapy and combination therapy;
3. To assess the effectiveness of empirical antibacterial therapy.

The following criteria were selected to assess the state of antibacterial therapy:

1. The proportion of patients prescribed antibacterial therapy;
2. The number of patients prescribed a single antibiotic;
3. The proportion of patients prescribed cephalosporins;
4. The number of patients prescribed two antibiotics;
5. The number of patients prescribed three or more antibiotics.

To determine the effectiveness of cefazolin and ceftriaxone as empirical antibacterial therapy, their use in both monotherapy and combination therapy was analyzed.

Assessment of Risk of Bias. Since this study aimed to investigate the state of antibacterial therapy in the clinic, a one-time cross-sectional study was chosen to assess the effectiveness of antibacterial therapy as a rapid and low-cost method for evaluating the efficacy of antibacterial drugs.

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The examination of antibacterial prescription practices in the clinical departments was conducted without interfering in the treatment process. The patients' condition and diagnosis were not selected, and the final outcome of anti-infective therapy was not considered. The primary criterion for evaluating the effectiveness of antibacterial therapy was the adequacy of a single prescribed drug or the addition of an extra antibiotic at the time of the study. This approach helps to reduce the risk of bias in clinical research.

Results and Discussion. To assess the state of antibacterial therapy in the clinic, we attempted to interpret the results of a prospective cross-sectional study conducted on the medical records of patients in the hospital.

Medical records of 235 patients who received treatment from October 20 to 23, 2025, were analyzed. Among them, 216 patients were prescribed antibacterial therapy. In our study, the prevalence of antibacterial therapy was 91.9%.

The results of the study are presented in Table 1. As shown in Table 1, in a hospital providing both emergency and planned medical care, antibacterial therapy was most often administered as monotherapy. At the time of the study, the majority of patients (75%) received a single antibiotic during treatment. Two antibacterial drugs were prescribed to 38 patients, accounting for 17.6% of all patients who received antibacterial therapy.

Table 1 – State of Antibacterial Therapy

Number of Antibiotics	Number of Patients	Proportion (%)
1 antibiotic	162	75%
2 antibiotics	38	17,6%
3 antibiotics*	14	6,5%
4 antibiotics*	2	0,9%
Total	216	100%

*Note: * — Cases where 3 or 4 antibiotics were prescribed in total, taking into account previously administered antibiotics.*

The combined proportion of patients prescribed three or more antibiotics was 7.4%. Analysis of the medical records of 162 patients who received a single antibacterial agent during the study period showed that 126 patients were treated with cephalosporins (cefazolin – 52, ceftriaxone – 73), while 36 patients received antibiotics from other groups: fluoroquinolones – 26 (ofloxacin, ciprofloxacin, levofloxacin), aminoglycosides – 7 (amikacin, gentamicin), and metronidazole – 3.

To evaluate the effectiveness of cefazolin and ceftriaxone as the main antibiotics in postoperative patients, all medical records in which these antibiotics were used were analyzed.

In the overall pattern of antibacterial prescriptions, cephalosporins were prescribed as initial antibacterial therapy in 175 out of 216 patients, corresponding to 81.0% (Table 2).

Table 2. Number of Patients Prescribed Drugs Belonging to the Cephalosporin Group

Antibiotics	1 drug	2 drugs	3 drugs	Total
Cefazolin	52	12	-	64
Ceftriaxone	73	24	13	110
Cefuroxime	1	-	-	1
Cephalosporins	126	36	13	175

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In this study, cephalosporins were prescribed as monotherapy to 126 patients, while a second antibiotic was added for 36 patients. Among 14 patients who received three antibiotics, 13 were treated with cephalosporins.

The study of the overall effectiveness of antibiotics belonging to the cephalosporin group showed that their effectiveness was observed in 72.0% of cases.

Cefazolin was prescribed to 64 patients, including 52 as monotherapy and 12 with an additional second antibiotic. The effectiveness of cefazolin was 81.3%.

Ceftriaxone was prescribed to 110 patients: 73 received it as monotherapy, 24 with an additional second antibiotic, and 13 with a third antibiotic. The effectiveness of ceftriaxone was 66.4%.

Cefuroxime was prescribed to only one patient. According to the study results, the effectiveness of cefazolin was 81.3%, while that of ceftriaxone was 66.4%.

Conclusion

1. A cross-sectional study can be used to assess the state of antibacterial therapy in a clinical setting.

2. The low effectiveness of ceftriaxone in antibacterial therapy indicates the need for careful monitoring of this drug.

Conflicts of Interest: The authors declare no conflicts of interest.

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