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CUMULATIVE ANTIBIOGRAM IN THE SELECTION OF EMPIRIC ANTIBIOTIC THERAPY

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Local microbiological monitoring was carried out based on the results of bacteriological studies of clinical samples from 892 patients in the departments of anesthesiology, intensive care and surgical departments in a multidisciplinary hospital. 1086 microorganisms were isolated, of which 837 isolates of bacterial pathogens (77.07 %) and 249 isolates of Candida fungi were isolated. Among the detected bacterial pathogens, gram-negative bacteria probably prevailed ($p<0.001$) over gram-positive ones (568 (67.86 %) and 269 (32.14 %), respectively). Among gram-negative bacteria, Escherichia coli (46.83 %) ($p<0.001$) was isolated more often, Pseudomonas aeruginosa (20.77 %) ($p<0.05$) and Klebsiella pneumoniae (15.67 %) were less frequently detected. Probably ($p<0.001$) more often (in 258 out of 568 cases) the indicated pathogens were detected in clinical samples of washings from the skin area around the installed peripheral vascular catheter: E. coli (44.57 %), Ps. aeruginosa (21.71 %), Kl. pneumoniae (16.28 %) and other gram-negative bacteria (17.44 %). The results of the cumulative antibiogram indicate the low sensitivity of E. coli to most antimicrobial drugs, which is a very threatening situation, taking into account the fact that as empirical antibiotic therapy, a drug with a sensitivity of at least 80.0 % can be used according to the results of local microbiological monitoring according to previous year The actual results of the study indicate the need to implement a cumulative antibiogram in the work of medical institutions that provide round-the-clock inpatient care. The need for dynamic assessment of the susceptibility of pathogens causing healthcare-associated infections to antibacterial drugs is vital, especially for the sick departments of anesthesiology and intensive care and the surgical profile. The introduction of the results of the cumulative antibiogram into the standard operating procedures is a primary task in the administration of the use of antibacterial and antifungal drugs.

Key words: cumulative antibiogram, antimicrobial resistance, empiric antibiotic therapy

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КУМУЛЯТИВНА АНТИБІОГРАМА У ВИБОРІ ЕМПІРИЧНОЇ АНТИБІОТИКОТЕРАПІЇ

Проведено локальний мікробіологічний моніторинг за результатами бактеріологічних досліджень клінічних зразків від 892 хворих відділень анестезіології, інтенсивної терапії та відділень хірургічного профілю у багатопрофільному стаціонарі. Виділено 1086 мікроорганізмів, з них – 837 ізолятів бактеріальних збудників (77,07 %) та 249 ізолятів грибків роду Кандида. Серед виявлених бактеріальних збудників грамнегативні бактерії вірогідно переважали ($p<0,001$) грампозитивні (568 (67,86 %) та 269 (32,14 %) відповідно). Серед грамнегативних бактерій вірогідно частіше виділяли Escherichia coli (46,83 %) ($p<0,001$), рідше виявляли Pseudomonas aeruginosa (20,77 %) ($p<0,05$) та Klebsiella pneumoniae (15,67 %). Вірогідно ($p<0,001$) частіше (у 258 із 568 випадках) вказані збудники виявляли у клінічних зразках змивів з ділянки шкіри навколо встановленого периферичного судинного катетеру: E. coli (44,57 %), Ps. aeruginosa (21,71 %), Kl. pneumoniae (16,28 %) та інші грамнегативні бактерії (17,44 %). Результати кумулятивної антибіограми вказують на низьку чутливість саме E. coli до більшості антимікробних препаратів, що є дуже загрозливою ситуацією, зважаючи на те той факт, що у якості емпіричної антибіотикотерапії можна застосовувати препарат з чутливістю не менше 80,0 % за результатами локального мікробіологічного моніторингу за попередній рік. Власні результати дослідження вказують на необхідність впровадження у роботу лікувальних закладів, що надають цілодобову стаціонарну допомогу кумулятивної антибіограми. Необхідність динамічної оцінки чутливості збудників, що викликають інфекції, пов'язані з наданням медичної допомоги, до антибактеріальних препаратів є життєво необхідною, особливо для хворих відділень анестезіології та інтенсивної терапії та хірургічного профілю. Внесення результатів кумулятивної антибіограми до стандартних операційних процедур є першочерговою задачею у адміністрування застосування антибактеріальних та антифунгальних препаратів.

Ключові слова: кумулятивна антибіограма, антимікробна резистентність, емпірична антибіотикотерапія

The study is a fragment of the research project "Development of antimicrobial biomaterials based on natural biopolymers and quaternary ammonium compounds", state registration No. 0122U201372.

The rational use of antimicrobial drugs (AMD) has a major impact on reducing the level of resistance in highly virulent pathogens that cause healthcare-associated infections (HAIs). According to the level of effectiveness of the used antimicrobial therapy (AMT), the quality and safety of providing medical care to patients who need treatment with antimicrobial drugs are evaluated [2].

According to the World Health Organization (WHO), the basis of improving the provision of medical care in health care facilities (HCF) of any form of ownership is the reduction of the level of HAIs and the spread of pathogens with antimicrobial resistance (AMR) [11, 13].

When a patient is admitted to a medical facility and when signs of an infectious disease are detected, the doctor has very little time to prescribe empiric antibiotic therapy (EAT). A fundamentally important aspect of the appointment of EAT is the timely selection of samples of biological material (blood, cerebrospinal fluid, urine, sputum) obtained from the areas as close as possible to the place with clinical signs of infectious inflammation, the collection must be carried out by an invasive method. The clinical material is sent to the microbiological laboratory as soon as possible. The study is conducted on both aerobic and anaerobic bacteria [1, 3]. Before obtaining the results, it is necessary to appoint AMT empirically, the decision regarding the expediency of choosing one or another AMD is made by the attending physician.

If the patient is diagnosed with sepsis or septic shock, AMT should be started within the first hour [3]. This is a very difficult task. As the authors indicate, only in 37.23±3.54 % of cases it is possible to correctly select AMD at the beginning of AMT using an empirical approach [6]. The empirical approach is the treatment of the disease before establishing the etiology of the infectious agent, based on clinical guesswork. Clinical guesswork is based on medical experience and a pragmatic approach [10]. So, for the selection of EAT, it is necessary to take into account: to which risk group for the presence of microorganisms with antimicrobial resistance (AMR) and invasive candidiasis does the patient belong (individual risk), what is the expected effect of the prescribed AMD, to which group (gram-positive or gram-negative) the pathogen most likely belongs, taking into account the anatomical localization of the focus of inflammation, the conditions for the occurrence of the disease (HAIs or community-acquired infection) are clarified [1, 3, 4].

Most often, one AMD is appointed for EAT. However, there may be cases when it is necessary to prescribe several antimicrobial drugs, in which case it is necessary to determine the etiology of the pathogen and its sensitivity to AMD within 72 hours, which will allow switching to monotherapy (ie de-escalation). Before the appointment of EAT, a method of accelerated identification is used to identify markers of inflammation of bacterial etiology – determination of the level of procalcitonin [3].

The choice of drug for EAT is also based on the data of local, and in its absence – regional or national monitoring of AMD, which indicate the possible resistance of pathogens to the selected AMD [3].

The clinical units, where the conditions for the formation of microorganisms from AMR (MAMR) are most often created, include the department of anesthesiology and intensive therapy (AIT), the department of a surgical profile, which is associated with the severity of the patient's condition, with their frequent long-term hospitalization and the appointment of AMT for vital indications [5, 8].

The need for the empirical selection of AMT determines the relevance of the introduction of local microbiological monitoring (LMM) – the analysis of the results of determining the antibiotic sensitivity of selected pathogens for a single drug [2, 9]. This problem is solved thanks to the creation of a cumulative antibiogram (CAG) [11]. Analysis of the results of bacteriological studies, determination of total resistance to antibacterial drugs helps clinicians to select EAT. Analysis of multi-year studies allows comparison of cumulative sensitivity with previous periods of observation. Thus, it is possible to track changes in the resistance of pathogens over time, to carry out effective measures to prevent the spread of MAMR, both in the conditions of each HCF and in the conditions of the state [7, 12]. The use of cumulative antibiograms, to a large extent, will help to save very valuable time, which can cost lives [8].

The purpose of the study was to implement the method of cumulative antibiogram for the selection of empiric antibiotic therapy in patients with signs of an infectious disease in the conditions of a multidisciplinary hospital.

Materials and methods. A retrospective analysis of the results of microbiological studies of the clinical material of patients with HAIs, who were undergoing inpatient treatment in a multidisciplinary secondary (specialized) medical care hospital in 2023, was conducted. It includes twenty structural subdivisions, nine of which are surgical. Five departments were included in the study: anesthesiology and intensive care (AIT), and four surgical departments (two urological departments, surgical and trauma departments). Collection of clinical material was carried out when signs of an infectious disease appeared in the patient 72 hours or more after admission to the hospital. The hospital has implemented an infection control program, according to which epidemiological surveillance of HAIs is carried out, and during 2023, LMM was conducted to determine the sensitivity of pathogens to AMD [2].

The results of microbiological studies of clinical samples taken from patients before the appointment of AMT with determination of the sensitivity of pathogens according to the EUCAST method were used to create the CAG [2].

The analysis of the results of microbiological studies of 841 samples of clinical material was carried out: blood (125 samples), sputum (115), urine (82), secretions from the wound (SW) (109), scrapings from the skin around the vascular catheter (SVC) (410). Clinical samples were collected using standard operating procedures (SOP) [4]. Bacteriological blood tests were performed using the incubation method for 7-10 days. Bottles with positive blood cultures and other isolated samples were first grown on blood agar for 24-48 hours at 37 °C [13]. After the growth of cultures, the drug was prepared and stained according to Gram, the type of pathogen was determined according to the manufacturer's instructions.

Antimicrobial susceptibility was tested on Petri dishes using Vitek 2 susceptibility discs provided by the manufacturer (HIMedia Laboratories Pvt, Limited Mumbai, India). Standard reference strains were used to test the effectiveness of the culture medium for growing gram-positive pathogens. The results of sensitivity to AMD were interpreted according to EUCAST criteria [2, 11].

Data were extracted using the Laboratory Information System (WHONET). An analysis of the frequency of detection of pathogens and their sensitivity to antimicrobial drugs was carried out. Statistical analysis of the results was carried out using the STATISTICA-5 program (version for medical research).

To determine the total antibiotic sensitivity, pathogens that were detected in the amount of 30 or more were selected for analysis. The frequency of detection and indicators of sensitivity to AMD were calculated in absolute and relative values. Student's coefficient was used to determine reliable differences. Statistical significance was determined at the level of $p<0.05$, and high statistical significance at the level of $p<0.001$. To create stable conditions, the material was collected by the same personnel. Informed consent was obtained from all patients to whom the study was conducted.

Results of the study and their discussion. During the study of 841 clinical samples in 2023, 1,086 microorganisms were isolated, of which 837 isolates of bacterial pathogens (77.07 %) and 249 isolates of Candida albicans (C. albicans) were isolated. From the total number of bacterial pathogens, 568 isolates (67.86 %) were gram-negative bacteria, and 269 (32.14 %) were gram-positive. Among gram-negative bacteria, Escherichia coli (E. coli) (46.83 %) was most often isolated, Pseudomonas aeruginosa (Ps. aeruginosa) (20.77 %), Klebsiella pneumoniae (Kl. pneumoniae) (15.67 %) and other bacteria less often (16.73 %). Most often (in 258 out of 568 cases), these pathogens were detected in scrapings from the skin around the vascular catheter (SVC): E. coli (44.57 %), Ps. aeruginosa (21.71 %), Kl. pneumoniae (16.28 %) and other gram-negative bacteria (17.44 %) (Table 1).

Table 1

Isolation of gram-negative pathogens in samples of clinical material of patients in 2023

Pathogen	Gram-negative pathogens, number of isolates					Total
	E. coli	Kl. pneumoniae	Ps. aeruginosa	Pr. mirabilis	E. faecalis/ VRE	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Sputum	11	18	17	2	0	48 (8.45)
Blood	52	11	13	8	11	95 (16.73) *
Urine	44	8	11	8	8	79 (13.91)
SVC	115	42	56	19	26	258 (45.42) **
SW	44	10	21	4	9	88 (15.49)
In total	266 (46.83) **	89 (15.67)	118 (20.77) *	41 (7.22)	54 (9.51)	568 (100)

*Statistically significant difference (p value <0.05), ** high statistical significance (p value <0.001)

Gram-negative pathogens were detected in most samples of clinical material, except for sputum, where gram-positive bacteria were more often isolated (in 67 out of 115 cases), including Streptococcus viridans (Str. viridans) (31 isolates), Streptococcus pneumoniae (Str. pneumoniae) (21 isolates) and other Gram-positive cocci (Staphylococcus epidermidis (St. epidermidis), Staphylococcus aureus/MRSA (St. aureus/MRSA) and Streptococcus pyogenes (Str. pyogenes) (total 15 isolates) (Table 2, Fig. 1).

Table 2

Isolation of gram-positive pathogens in samples of clinical material of patients in 2023

Pathogen	Gram-positive pathogens, number of isolates					Total
	Str. viridans	Str. pneumoniae	Str. pyogenes	St. epidermidis	St. aureus/MRSA	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Sputum	31	21	5	2	10	69 (25.65)
Blood	0	0	0	18	12	30 (11.15)
Urine	0	0	0	2	1	3 (1.12)
SVC	35	25	7	39	41	147 (54.65)
SW	0	0	0	9	11	20 (7.43)
In total	66 (24.54)	46 (17.10)	12 (4.46)	70 (26.02)	75 (27.88)	269

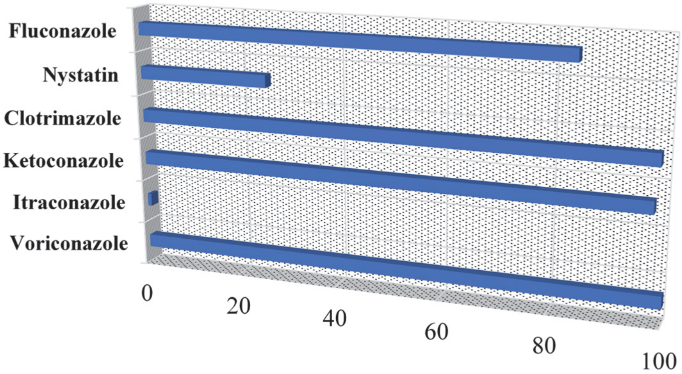


Fig. 1. Sensitivity of Candida albicans to antifungal drugs.

In clinical samples, gram-negative pathogens were probably detected more often than gram-positive ones, which indicates a high level of prevalence and their role in the development of HAIs in the investigated medical institution. Of the 125 blood samples of sepsis patients, gram-negative pathogens were found in 95 (76.00 %), gram-positive pathogens in 30 (24.00 %), and Candida albicans (C. albicans) (11.20 %) were simultaneously detected in 14 samples (Tables 1–2). Of the 82 examined urine samples of patients, gram-negative pathogens were found in 79 (96.34 %), gram-positive pathogens in 3 (3.66 %), and C. albicans were additionally identified in 13 samples (15.85 %). Of the 117 examined sputum samples of patients with pneumonia, gram-negative pathogens were found in 48 clinical samples (41.03 %), gram-positive in 69 (58.97 %), and in 89 of them, C. albicans (76.07 %), isolates of which showed absolute sensitivity to voriconazole (100 %), high sensitivity to clotrimazole (98.80 %), ketoconazole (97.99 %) and fluconazole (84.34 %), and at the same time high resistance to nystatin (26.10 %), absolute resistance to itraconazole (0.80 %) (Fig. 1). Determination of the sensitivity of selected isolates to AMD showed a high degree of resistance among gram-negative pathogens ($p<0.001$).

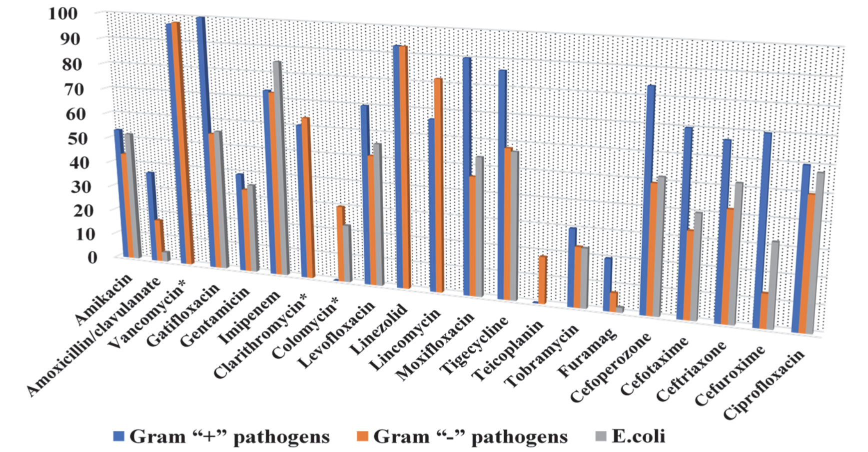


Fig. 2. Sensitivity to antimicrobial agents of pathogens detected in clinical blood samples of sepsis patients in 2023.

The highest rates of sensitivity of gram-positive pathogens were to gatifloxacin, vancomycin, linezolid, and moxifloxacin: 100 %, 96.84 %, 93.10 %, and 90.0 %, respectively (Fig. 2). Among the detected gram-negative pathogens, the highest level of sensitivity was determined to vancomycin, linezolid, lincomycin, and imipenem: 97.56 %, 92.95 %, 81.82 %, and 72.63 %, respectively. E. coli was detected in 52 out of 95 samples (54.74 %), which had sufficient sensitivity only to imipenem (84.62 %).

Thus, it is advisable to prescribe vancomycin or linezolid as empirical AMT for patients with sepsis who are in a serious condition. With the average severity of the patient's clinical condition, the following can be prescribed as empiric therapy: tigecycline, cefoperazone, imipenem, the sensitivity to which among gram-positive pathogens was: 86.21 %, 83.87 % and 73.33 %, respectively; among the detected gram-negative pathogens: lincomycin and imipenem, the sensitivity to which was 81.82 % and 72.63 %, respectively.

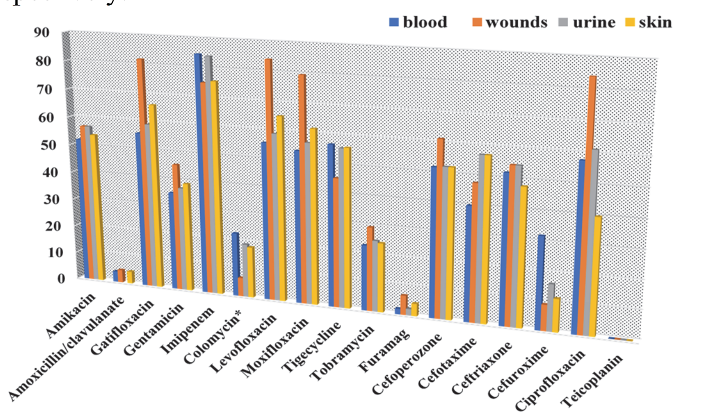
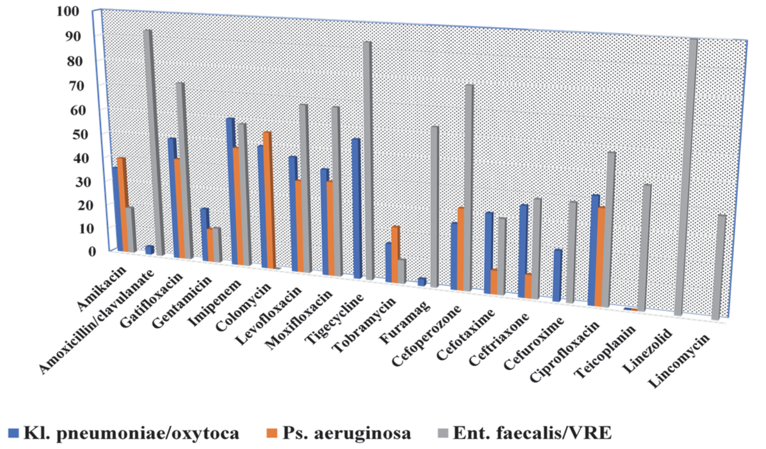


Fig. 3. Sensitivity to AMD of E. coli isolates detected in clinical samples of patients in 2023.

The sensitivity of E. coli isolates to AMD was analyzed separately detected in clinical samples: blood (52 isolates), SW (44), urine (44), SVC (115) (Fig. 3). Isolates of E. coli. isolated from the wound, had the highest sensitivity to: ftorchinolones (levofloxacin (84.09 %), cyprofloxacine (84.09 %), gatifloxacin (81.82 %), moxifloxacin (79.55 %)), and imipenem (75.00 %). And, on the contrary, E. coli had absolute resistance to teicoplanin (0), amoxicillin/clavulanate (4.35 %), furamag (4.35 %), cefuroxime (11.50 %), colomycin (17.65±1.18 %).

Kl. pneumoniae showed a very low level of sensitivity to most AMD, the highest sensitivity was determined to imipenem (60.05 %) and tigecycline (55.78 %). Ps. aeruginosa showed a low level of sensitivity to most of the studied AMD, with the highest level to colomycin (55.71 %), Ent. faecalis/VRE showed the highest level of sensitivity to linezolid (100 %), amoxicillin/clavulanate and tigecycline (93.05 %, respectively) and to cefoperazone (79.34 %) (Fig. 4A).



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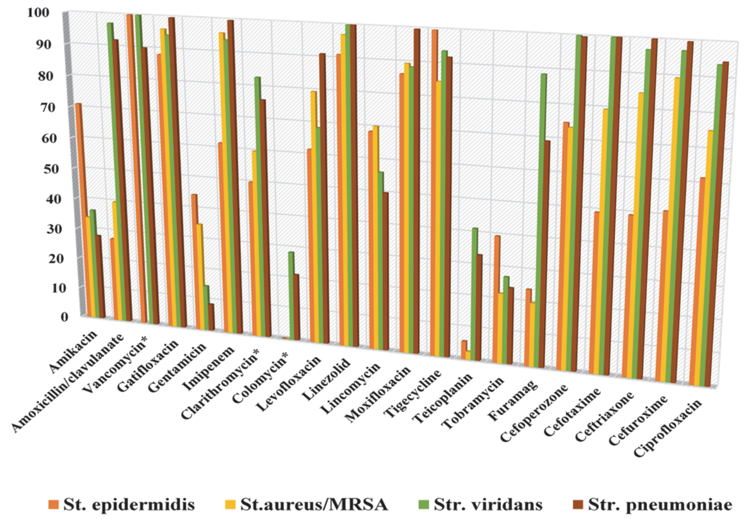

B

Fig. 4. A– Sensitivity to AMD Kl. pneumoniae, Ps. aeruginosa and Ent. faecalis/VRE. B – Sensitivity of gram-positive pathogens (St. epidermidis. St. aureus/MRSA, Str. viridans and Str. pneumoniae) to antimicrobial drugs.

Gram-positive microorganisms (St. epidermidis. St. aureus/MRSA, Str. viridans, Str. pneumoniae), isolated from various clinical samples of patients, revealed a low level of resistance to AMD (Fig. 4B). A high level of sensitivity has been determined to ftorchinolones (gatifloxacin, cyprofloxacine), linezolid, tigecycline, cephalosporins of the 3rd generation, vancomycin, amoxicillin/clavulanate.

Thus, the isolation of gram-negative pathogens was observed more often compared to gram-positive ones (567/269; $p<0.001$). Among gram-negative pathogens, E. coli was most likely isolated (266 isolates; $p<0.001$).

In Ukraine, there is still a problem of irrational use of AMP, there is access to the dispensing of drugs without a prescription, only the state system of control over the use and correct prescription of this group of drugs is being introduced, therefore, the creation and constant updating of CAG in each drug store is a very important task [2, 3].

In 2021, the order of the Ministry of Health of Ukraine No. 1614 [4] entered into force, one of the sections of which clearly defines the organizational principles for the appointment and use of AMD in order to prevent the appearance and spread of microorganisms with antimicrobial resistance. According to the Instruction [2], the hospital develops and applies the SOP for the administration of the appointment of AMD for the appointment, distribution, purchase and reception of AMD. For the development of SOP, data from local AMD of infectious agents clinically significant for a particular hospital, results of cumulative antibiogram regarding the most effective and safe AMT schemes are used, it is forbidden to prescribe AMD to patients of hospital, if they are not included in this SOP.

The cumulative antibiogram was obtained on the basis of the analysis of the results of the antibiotic sensitivity of the detected pathogens that caused HAIs in patients of AIT and departments of a surgical profile. The results obtained by us are implemented in the work of health care facilities through the SOP, which presents a list of AMD recommended as empiric therapy for patients in a severe condition (with a determined sensitivity level of 90.0±2.52 % and higher) and for patients in a moderate condition (80.0±1.89 % and higher) [11, 13]. Thus, in similar studies, the authors indicate the importance of the priority implementation of CAG when choosing empiric antibiotic therapy, which is specific for AIT departments. The choice of EAT is based on the results of constant local microbiological monitoring [9]. Before the implementation of the updated SOP, the epidemiologist trained doctors on the rules of empirical selection, prescribing AMT, according to the results of LMM for the previous year. Before the appointment of AMT, the collection of biological material from the patient and the continuation of permanent LMM in each department and their updating and revision every year are mandatory [3].

The results of our study showed a wide prevalence of gram-negative microflora in the AIT department and other surgical departments, which is consistent with the data of other authors [6, 8]. In contrast to the results presented by other authors, in the department of AIT and other departments of the surgical profile of our hospital, E. coli was probably isolated more often, Ps. aeruginosa. less often Kl. pneumoniae [8]. According to the results of LMM for the past year, the created CAG indicates the low sensitivity of E. coli to most AMD, which is a very threatening situation, taking into account the fact that a drug with a sensitivity of at least 80.0 % can be used as an EAT. However, E. coli isolated from clinical blood samples showed sensitivity only to imipenem in 84.62 % of cases, from urine – in 84.09 %, from the surface of the skin around the vascular catheter (SVC) – in 75.65 %, from the wound – in 75.00 %. At the same time, E. coli isolates detected from wounds showed high sensitivity to several AMD from the ftorchinolones group (84.09 % – to levofloxacin and cyprofloxacin, respectively, 81.82 % – to gatifloxacin, 79.55 % – to moxifloxacin). It should be noted that, in contrast to the published results [5, 9], our study revealed a high level of antimicrobial resistance to colistin in E. coli isolated from clinical samples of blood, urine, wound surfaces, SVC (17.65±1.18 %).

The results obtained by us indicate a high general sensitivity to vancomycin (93.12±2.89 %), and gram-positive (91.28±3.21 %), and gram-negative microflora (100 %), which differs from the results presented by the authors sensitivity [5] to vancomycin.

A low level of detection of St. aureus/MRSA – 73 isolates out of 837 (8.72 %); the identified isolates of the pathogen showed high sensitivity to ftorchinolones. oxazolidinones, carbapenems, cephalosporins, glycylcyclines (gatifloxacin, linezolid (95.12 % each), imipenem (94.87 %), moxifloxacin and cefuroxime (87.81 % each), ceftriaxone (82.93 %), tigecycline (82.50 %), cefotaxime (80.00 %), in contrast to the presented results of a study conducted in Egypt, where St. aureus/MRSA was isolated with a high level of resistance [8].

Thus, we have shown a very important role of CAG in the selection of EAT in patients with AIT and other departments of a surgical profile. Considering the severity of the condition of most patients, the use of CAG results significantly saves time and effort for the recovery of such patients. The study covered not only the study of antimicrobial resistance, but also the prevalence of microorganisms, the nature of detection of pathogens in various clinical samples, which improves the economic efficiency of EAT.

Conclusion

It is necessary to implement local microbiological monitoring in the work of each hospital that provides round-the-clock inpatient care, to increase the results of CAG in a separate hospital for the possibility of selecting AMD, controlling the level of sensitivity of pathogens, creating possible combinations of AMD as EAT in cases of the formation of a high level of resistance of pathogens. The use of CAG for the selection of EAT is the optimal measure to improve the results of treatment of critically ill AIT and other departments of a surgical profile. It is very important to create a regional and national CAG for those medical facilities where full-fledged bacteriological research is not yet possible.

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DYNAMICS OF PSYCHOPATHOLOGICAL SYMPTOMS IN THE POST-COVID-19 PERIOD

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The dynamics of post-COVID-19 psychopathological manifestations in 31 men and 33 women were studied. It was established that fatigue (75 %), anxiety (70 %), cognitive dysfunction (69 %) and low mood (63 %) dominate the structure. The dynamics of depressive and anxiety changes were more pronounced in the first 6 months (from 63 % to 34 % and from 70 % to 48 %), and fatigue, cognitive impairment and insomnia – after 12 months (from 63 % to 28 %, from 63 % to 23 % and from 33 % to 22 %). In the early period, clinically defined depressive disorders were found in 36 % of patients, in the late period – in 8 %. The prevalence of psychopathological symptoms other than irritability was non-significantly higher among women; they were also found to have higher levels of depression and anxiety. Two years after COVID-19, symptoms of fatigue, cognitive dysfunction, dyssomnia, depression, and anxiety were present in 22 %, 17 %, 16 %, 14 %, and 13 %, respectively. Depression and anxiety rates normalized 12 months after COVID-19, faster in men than in women.
Key words: COVID-19, post-COVID-19 period, depression, anxiety, fatigue, cognitive dysfunction

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ДИНАМІКА ПСИХОПАТОЛОГІЧНОЇ СИМПТОМАТИКИ В ПОСТКОВІДНОМУ ПЕРІОДІ

Досліджено динаміку постковідних психопатологічних проявів у 31 чоловіка і 33 жінок. Встановлено, що у структурі постковідних психопатологічних проявів домінують втома (75 %), тривога (70 %), когнітивна дисфункція (69 %) та знижений настрій (63 %). Динаміка депресивних і тривожних змін у постковідному періоді була більш виражена у перші 6 місяців (з 63 % до 34 % і з 70 % до 48 %), а втоми, когнітивних порушень та безсоння – після 12 місяців (з 63 % до 28 %, з 63 % до 23 % і з 33 % до 22 %). У ранньому постковідному періоді клінічно оформлені депресивні розлади виявлені у 36 % пацієнтів, у пізньому – у 8 %. Поширеність психопатологічних симптомів, крім дратівливості, була незначуще вищою серед жінок; у них також виявлено вищі рівні депресії і тривоги. Через два роки після COVID-19 симптоми втоми, когнітивної дисфункції, диссомнії, депресії і тривоги були наявні у 22 %, 17 %, 16 %, 14 % та 13 % відповідно. Показники депресії і тривоги нормалізувалися через 12 місяців після COVID-19, у чоловіків швидше, ніж у жінок.
Ключові слова: COVID-19, постковідний період, депресія, тривога, втома, когнітивна дисфункція

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Monitoring the effects of COVID-19 has revealed a wide range of long-term disorders after the resolution of respiratory symptoms. These disorders have been referred to as "long COVID-19", "post-acute COVID-19", "long-haul COVID-19", but the term "post-COVID-19 syndrome" is most often used. The National Institute for Health and Care Excellence guidelines define the post-COVID-19 syndrome as "signs and symptoms that develop during or after an infection consistent with COVID-19, continue for more than 12 weeks and are not explained by an alternative diagnosis" [6]. Total prevalence of post-COVID-19 syndrome estimated to 35 % in the general population and up to 85 % in previously hospitalized patients [9].