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ABOUT THE PROBLEM OF PRESCRIBING ANTIBIOTICS FOR THERAPEUTIC PURPOSES

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Nowadays, the problem of antibiotics overuse is becoming increasingly widespread. One of the primary threats is antimicrobial resistance (AMR) – the adaptability of bacteria to antibiotics, which complicates the process of patient's healing, increases the percentage of postsurgical complications, and increases mortality. The main cause of antimicrobial resistance occurrence is uncontrolled or inappropriate use of antibiotics. Thus, according to the research in [1], up to 50% of prescribed antibiotics do not meet medical recommendations, which in turn leads to decreased sensitivity of pathogens to medicines. These results are largely due to the inability of medical staff to check current recommendations for antibiotic prescribing quickly and effectively.

A vast number of modern medical decision support systems (MDSS) do not enjoy the trust of medical staff due to their perception of unreliable search algorithms and lack of a clear interface. In addition, existing software, and technical tools (Antimicrobial Stewardship Toolkits, VITEK 2 Systems, MicroScan System, MALDI-TOF MS [2]) are based on microbiological tests (e.g., resistance gene detection) that must be performed to set the initial search parameters. However, in practice, physicians encounter cases when antibiotic therapy should be started before laboratory data is available. In this case, the therapist is no longer able to use a medical DSS but is forced to look for other ways to solve the problem.

Thus, the aim of this paper is to develop a system to support physician's decision-making process on the prescription of antibacterial agents to improve the quality of medical services. An important task that is pursued when developing an application is to make its interface intuitively understandable for medical users who do not have knowledge of database logic. In addition, this decision support system, unlike the existing ones, should function even with a minimum number of laboratory tests, which is well suited for working in resource-limited conditions and for empirical therapy. These criteria meet the needs of physicians, for whom this application is being developed.

In the course of this paper, a DSS was developed that allows a doctor to independently control or update the rules for prescribing medications. By editing the data in the Excel file where the database is stored, the medical expert can add or remove antibiotics to which certain pathogens are sensitive, while the pathogens themselves are also presented in the table in a normalized form. In addition, it is possible to change

the priority of antibiotics and modify special conditions for prescribing them in various cases.

The developed software offers two types of searches: global and patient-oriented. With a global search, the program returns general recommendations to fight a disease and/or a pathogen. Patient-oriented search allows users to make recommendations personalized for patients by filtering medications according to such indicators as pregnancy status, age, allergies/allergic reactions, contraindications, HIV/AIDS, and previous TB disease. The main window of the program is shown in Figure 1.

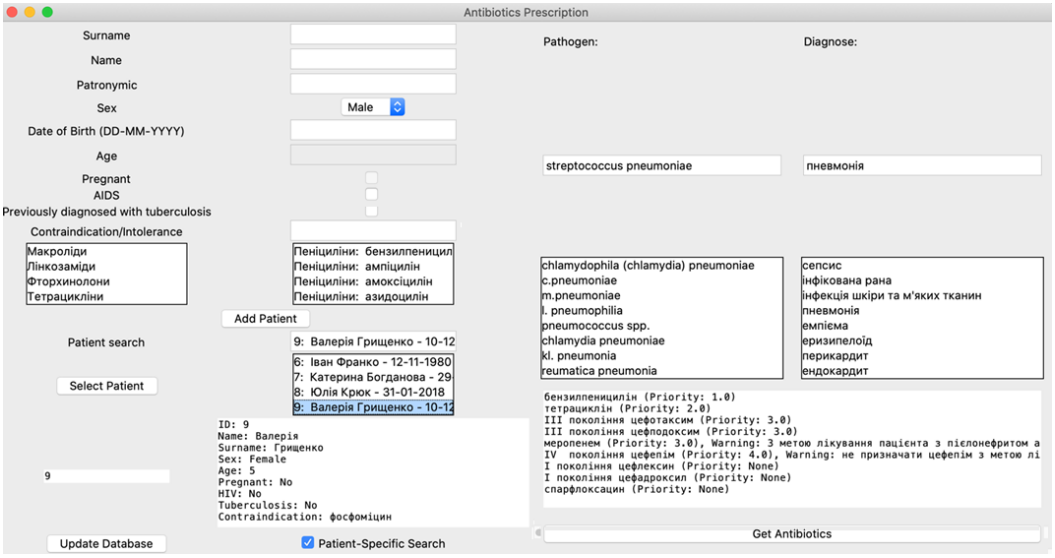

Figure 1 – Main window of the medical decision support system.

The program is based on SQL queries, but the user does not have direct access to create them. The decision support system «filters» the total set of antibiotics in such a way that in case of contraindications to the recommended drugs for a particular health condition, the DSS will return possible solutions that the doctor will be able to evaluate.

Conclusion. The decision support system developed in this paper will help reduce the number of cases of misuse of antibiotics and simplify the analysis of the choice of a drug to fight bacterial infections. The correct choice of antibiotics will reduce the global number of resistant organisms and thus improve the effectiveness of therapy with dangerous drugs.

List of references

1. Measuring Outpatient Antibiotic Prescribing. URL: https://www.cdc.gov/antibiotic-use/data/outpatient-prescribing/index.html
2. Gajic I, Kabic J, Kekic D, Jovicevic M, Milenkovic M, Mitic Culafic D, Trudic A, Ranin L, Opavski N. Antimicrobial Susceptibility Testing: A Comprehensive Review of Currently Used Methods. *Antibiotics (Basel)*. 2022 Mar 23;11(4):427. doi: 10.3390/antibiotics11040427.