

Review

By

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Member of the Scientific Jury based on Order No. P-109-335/29.07.2025 of the Rector of the Medical University – Varna. According to the Protocol 1 of the first meeting of the Scientific Jury held on 07.08.2025, I have been appointed to prepare a review.

Procedure for defending a dissertation for the award of an educational and scientific degree "Doctor", Field of higher education 7. Healthcare and sports, Professional field 7.3 Pharmacy, PhD program "Pharmacology (including Pharmacokinetics and Chemotherapy)"

Thesis topic

"Study of the hospital use of antimicrobial drugs intended for the prevention and treatment of obstetric and gynecological infections"

Author of the dissertation

Plamen Stefkov Bekyarov – full-time doctoral student at the Medical University – Varna.

Scientific supervisors

Assoc. Prof. Silvia Georgieva Mihaylova, PhD

Prof. Marieta Petrova Georgieva, MD

Procedure details

Plamen Stefkov Bekyarov was enrolled as a full-time doctoral student in the doctoral program "*Pharmacology (including Pharmacokinetics and Chemotherapy)*" at the Department of Pharmacology, Toxicology and Pharmacotherapy, Faculty of Pharmacy, Medical University of Varna, by Order No. P-109-113 dated 08.02.2023. After successfully passing the required examinations in his specialty and a foreign language, and upon completion of all tasks outlined in his individual study plan, he was discharged with the right to defend his dissertation by Order No. P-109-335 of the Rector of the Medical University of Varna.

The documents submitted by Mr. Bekyarov have been prepared accurately and in full compliance with the applicable procedures and the Regulations for the Development of Academic

Staff at the Medical University of Varna. All required documents are present in the submitted application package. The doctoral candidate has attached four scientific publications.

Biographical information about the candidate

Plamen Stefkov Bekyarov was born on January 1, 1992, in Stara Zagora, Bulgaria. He completed his secondary education at Zheleznik Secondary School. In 2017, he earned a Master's degree in Pharmacy from the Medical University of Varna. In 2022, he obtained a specialization in Clinical Pharmacy. In 2018, he was appointed Head of the Hospital Pharmacy at the "Prof. Dr. D. Stamatov" Military Medical Academy in Varna. His academic career at the Medical University of Varna began in 2019 as an honorary lecturer. In 2020, following a competitive selection process, he was appointed as a full-time assistant in the "Assistant Pharmacist" program at the Medical College, Medical University of Varna. In 2023, he was enrolled as a full-time doctoral student in the doctoral program "*Pharmacology (including Pharmacokinetics and Chemotherapy)*" at the Department of Pharmacology, Toxicology and Pharmacotherapy, Faculty of Pharmacy, Medical University of Varna. He is fluent in English and possesses strong computer skills. He is a member of the Bulgarian Association of Hospital and Clinical Pharmacists and the Bulgarian Pharmaceutical Union.

Relevance of the topic

The topic of the dissertation is highly relevant and addresses one of the most pressing challenges in contemporary medicine—combating antimicrobial resistance and promoting the rational use of antibiotics. The specific focus on obstetric and gynecological infections is of significant clinical and social importance, as it concerns vulnerable patient populations and is directly linked to maternal and neonatal health outcomes. The dissertation aligns fully with the priority areas identified by the World Health Organization and the European Union in the field of public health.

Structure of the dissertation

Plamen Stefkov Bekyarov's dissertation is well structured, covering 138 pages with 35 figures, 25 tables, and 1 appendix. The dissertation contains the following mandatory sections:

- Introduction – 1 page
- Literature review – 46 pages
- Goals and objectives – 1 page
- Materials and methods – 3 pages
- Results and discussion – 40 pages
- Conclusions – 1 page
- Contributions – 1 page
- References – 17 pages
- List of scientific publications and participations related to the dissertation – 1 page

There are 234 references in English and Bulgarian.

Literature review

The dissertation presents a comprehensive and well-structured literature review, encompassing both the historical development of antimicrobial therapy and the current state of the issue of antibiotic resistance. The author systematically traces the discovery of the major classes of antibiotics, their mechanisms of action, and the underlying causes of the emergence of resistant strains. Priority pathogens, as classified by the World Health Organization, are discussed in detail—including the ESKAPE group of microorganisms, which play a central role in the development of nosocomial infections. The review also includes a systematic analysis of resistance mechanisms, the characteristics of biofilm formation, quorum sensing, and the strategies for overcoming antibiotic resistance through antimicrobial stewardship programs.

The literature is critically assessed, enabling a well-founded analysis of existing theoretical frameworks. This provides clear evidence that the author has an excellent command of the subject matter.

Goals and objectives

Based on the literature review, the author formulates a clear and relevant goal – to study the hospital use of antimicrobial drugs intended for the prevention and treatment of obstetric and gynecological infections over a 12-year period. Six tasks are set, which are logically derived from the stated objective.

Materials and methods

The dissertation is characterized by a carefully selected and appropriately applied methodology, aligned with the aims and objectives of the study. The author employs modern statistical approaches to conduct an in-depth quantitative and qualitative analysis of antibiotic use. The research integrates both retrospective analysis of historical data and prospective assessment of trends in the utilization of antimicrobial agents. The primary indicator used is the defined daily doses per 100 bed days (DDD/100 bed days), which provides a standardized metric for measuring antibiotic consumption. This ensures the reliability and reproducibility of the results and enables comparability over time and across hospital departments.

The doctoral student has demonstrated proficiency in applying methods from the field of medical statistics, including data collection, analysis, interpretation, and presentation (both retrospective and prospective), which will support his capacity for conducting independent scientific research in the future.

Results and discussion

The results presented directly correspond to the objectives outlined in the dissertation. The retrospective analysis of antibiotic use, measured in standardized units of DDD/100 bed days, illustrates the dynamics of antibiotic therapy across four departments of the Prof. Dr. D. Stamatov Military Medical Academy Hospital over a 12-year period. The data indicate that the highest antibiotic consumption occurs in the Anesthesia and Intensive Care Unit (AICU) and the Gynecology Department.

The analysis of antibiotic use according to the World Health Organization's AWaRe classification—dividing antibiotics into Access, Watch, and Reserve groups—reveals a predominant use of agents from the Access group. This finding reflects rational antibiotic use and aligns with WHO recommendations.

The prospective analysis offers valuable opportunities for monitoring and controlling antibiotic consumption, facilitating supply planning and the timely identification of potential irregularities. Consequently, the employed methodology serves as a comprehensive tool to optimize antibiotic therapy and enhance treatment quality within the hospital setting.

Conclusions and contributions

Conclusions are formulated based on the results obtained. They are logically arranged and well structured. The contributions presented are well structured and divided into those of a scientific-theoretical nature and those of a scientific-applied nature. Some of them are listed below:

Scientific and theoretical contributions

- The statistical models developed on the basis of the available data can be used for a comparative analysis of antibiotic use between departments. This can serve as a basis for future predictive analyses and protocols related to rational antimicrobial policy.
- The results of the analysis provide a scientific basis for optimizing antibiotic therapy in line with resistance trends and the needs/specificities of different departments.
- The dissertation proposes a statistical approach for modeling and forecasting hospital antibiotic use, adapted to the structure of SBAGAL. This allows for long-term planning of drug needs and effective monitoring of antibacterial therapy.

Contributions of a scientific and applied nature

- The use of a standardized unit (DDD/100 bed days) ensures comparability of results and the possibility of intra-hospital and inter-hospital control.
- The statistical models used in the analysis could be used for future development and integration into the information systems of healthcare facilities for real-time tracking of trends, forecasting peak loads, optimizing deliveries, and automatically generating alerts for deviations.
- The quantitative approach and models used can be adapted and optimized for application in other hospital structures, which gives the study strategic value for the creation of national algorithms for the control and monitoring of antibiotic consumption.

Publications and participation related to the dissertation

The doctoral student has published the results of his dissertation in four full-text articles, two of which he is the first author. The results have also been presented at two international conferences, ensuring scientific visibility and data exchange with the international academic community.

Abstract

The abstract has been prepared in accordance with all requirements and includes an introduction, objectives and tasks, materials and methods, and results and discussion. It contains a total of 83 pages.

CONCLUSION

The dissertation covers a topical issue and has the necessary theoretical and practical value. It fully complies with the Law on the Development of Academic Staff in the Republic of Bulgaria, as well as with the Regulations for its implementation and the Regulations for the development of academic staff of MU-Varna for acquiring the academic degree of "Doctor". All this gives me reason to give a **POSITIVE ASSESSMENT** and to propose to the esteemed members of the Scientific Jury to vote for the award of the educational and scientific degree of "Doctor" in the field of higher education 7. Healthcare and Sports, professional direction 7.3. Pharmacy and PhD program in Pharmacology (including Pharmacokinetics and Chemotherapy) to Plamen Stefkov Bekyarov.

05.09.2025

Varna

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