

## **REVIEW**

by

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**Subject: Dissertation by Dr. Svetoslav Kirilov Todorov, supervised by Prof. Dr. Yavor Enchev, on the topic "Organization of Neurosurgical Care in Bulgaria - Comparative Analysis" for the awarding of the educational and scientific degree "Doctor" in the scientific specialty "Neurosurgery"**

### **Biographical Data**

Dr. Svetoslav Kirilov Todorov was born on March 24, 1988. He completed his secondary education with honors at the Bertolt Brecht Language High School in Pazardzhik, specializing in French and English. He graduated as a medical doctor from the Medical University of Pleven in 2014. His professional path includes work in the Multi-profile Emergency Department at Burgas University Hospital EOOD, as well as in the Neurosurgery Department of the same hospital, where he still works and has been the deputy director of the hospital since 2022. He specialized in Neurosurgery at the Medical University "Prof. Dr. Paraskov Stoyanov" in Varna, with practical training at Burgas University Hospital EOOD. In 2018, he completed a second master's degree in Public Health and Health Management at the Medical University of Pleven. Since January 2021, he has held a recognized specialty in Neurosurgery. In 2024, he became an honorary assistant in Neurosurgery for students at the Medical Faculty of "Prof. Dr. Asen Zlatarov" University in Burgas, and in February 2025, after a competition, he was appointed as an assistant in the Department of "Anesthesiology, Gynecology, Surgery, Orthopedics and Traumatology, Urology, Neurosurgery, Emergency and Intensive Medicine" at the same university. He is a member of the Bulgarian Neurosurgical Society (BNHS) and the Bulgarian Association of Healthcare Professionals (BAHP).

Dr. Todorov continuously improves his professional qualifications, as evidenced by additional certificates and attestations—courses in "Skull Base Surgery," "Clinical Electroencephalography," "Basics of Degenerative Deformations," and "Pediatric Neurosurgery." He has participated with reports and verified abstracts at national conferences and congresses—19 presentations, and has published 11 full-length scientific articles. The submitted dissertation, in addition to being current, also carries significant social importance. Two articles in full and two abstracts with posters at congresses are related to this work.

### **Significance of the Problem**

In Bulgaria, there is no existing approach for assessing the neurosurgical care provided. Developing recommendations for the organization of neurosurgical assistance, based on a comparative analysis, would be highly beneficial. This dissertation aims to present, analyze, and compare the current state of neurosurgical care in Bulgaria. A main goal is to develop and implement guidelines for access to neurosurgical care for Bulgarian patients, aiming to improve the quality and accessibility to levels comparable with developed European countries—Germany—and other high-income countries (HICs).



## **Understanding of the Problem**

The literature review is thorough and detailed, demonstrating a solid understanding of the issue discussed in the dissertation.

## **Dissertation Structure**

The presented dissertation titled “Organization of Neurosurgical Assistance in Bulgaria — Comparative Analysis” is 129 pages long and fully complies with all the established requirements. It consists of an Introduction and Literature Review (32 pages), Objectives and Tasks (1 page), Materials and Methods (8 pages), Results (25 pages), Discussion (38 pages), Conclusions (1 page), Contributions (1 page), Bibliography (8 pages), and Appendices (8 pages). The dissertation includes 6 tables and 48 figures. The bibliography contains 104 sources—14 in Cyrillic and 90 in Latin script. The sources are relevant to the topic and appropriately selected according to the content of the dissertation.

**The Introduction** is concise and precise, synthesizing the guidelines of the examined problem and emphasizing the necessity for its development.

**The literature review** is comprehensive and current, guiding the objectives and tasks of the dissertation.

**The goal** is to present, analyze, and compare the current state of neurosurgical care in Bulgaria and its organization. The goal is clearly defined, and the specific tasks are aligned with it:

- To analyze neurosurgical care in Bulgaria and its regional distribution.
- To investigate and analyze the current state of neurosurgical services offered in Bulgaria from a technical equipment perspective.
- To conduct a comparative analysis of the organization of neurosurgical care in Bulgaria and Germany.
- To propose recommendations for system improvements to enhance the quality and accessibility of neurosurgical assistance.
- To propose and apply artificial intelligence systems for reporting, analyzing, and forecasting neurosurgical care for various medical conditions.

**The research methods** chosen by the doctoral candidate are modern and appropriate, allowing achievement of the objectives and answering the research questions.

To accomplish the objectives and tasks, searches were conducted in Medline, PubMed, Google Scholar, Web of Science, and Embase for studies related to neurosurgical care in Bulgaria; seven main clinical pathways across 135 healthcare facilities in Bulgaria that perform neurosurgical operations and treatments were analyzed over a seven-year period; data were extracted from a survey conducted between June 3, 2024, and October 31, 2024 among the medical institutions providing neurosurgical care in Bulgaria; An electronic questionnaire has been developed to establish the current state of neurosurgical care in Bulgaria, containing 4 main sections. The results are presented in the form of graphs and tables, summarizing the information from the questionnaire of the participants; A study has been made covering a comparative analysis between the organization of neurosurgical care in a developed European country - Germany and the current state of the organization of neurosurgical care in Bulgaria. Statistical methods used for processing and analysis are used.



**The results** and the discussion are presented in 65 pages. and are perfectly illustrated with tables and figures. The general results are given and the conclusions from them are presented.

**The tasks** set are comprehensively and clearly answered. Presented:

1. Analysis of the medical institutions with revealed neurosurgery structures in Bulgaria, demonstrating an asymmetrical distribution of neurosurgery clinics/departments in the country. There is also a pronounced asymmetry, which takes into account areas with a higher percentage of neurosurgery structures detected, at the expense of a smaller number of doctors working in these areas and revealed structures.
2. Analysis and trends of neurosurgical operations in Bulgaria – after a study of neurosurgical operations in 135 medical institutions for the period 2017 – 2023 on the 7 main clinical pathways, the results show that the maximum number of surgeries is reported in 2019 and the minimum – in 2020, which is a reflection of the Covid-19 pandemic. Discussion of brain surgeries not provoked by trauma, Discussion of treatment of head injuries, Discussion of peripheral and cranial nerve surgeries, Analysis of spinal cord surgeries
3. Discussion of neurosurgical operations in the city of Sofia. Burgas, demonstrating that neurosurgical operations in the city of Burgas. Burgas are performed in 5 medical institutions, some of which do not have revealed structures for neurosurgery.
4. Discussion of the conducted survey, including analysis of: Staffing, Hardware Supply, Operational Activity, Accessibility of Imaging Diagnostics
5. Comparative analysis of the parameters of the organization of neurosurgical care in Bulgaria with those of Germany, showing significant differences between the two countries.
6. Applications of Feedforward networks in neurosurgery, as well as the application of the intercriteria analysis and discussion approach, which research highlights the importance of intelligent techniques in the field of neurosurgery, especially given the growing global burden of neurological diseases. The study provides information about the surgeries and therapies performed in the field of neurosurgery in Bulgaria.

**The conclusions** are short and clear and reflect the purpose and objectives of the dissertation.

**The contributions** stem from the results obtained and are concrete and of significant benefit to both the neurosurgical community and patients, namely:

1. Conducted an innovative study of the current state and organization of neurosurgical care in Bulgaria with identified problems and opportunities for improvement.
2. An original study of the parameters of the organization of neurosurgical care in Bulgaria with those of Germany was carried out with conclusions drawn.
3. Recommendations have been prepared to the structures in the country responsible for the organization of healthcare in order to improve the quality and accessibility of the neurosurgical care offered.
4. Artificial intelligence tools have been used to: predict the performed neurosurgical operations in hospitals and pathways; a comparative analysis of the links between diseases and surgeries was made; Data clustering has been done.

In connection with the dissertation, the following publications are presented:

## **Publications**

1. Publications:

1.1. S. Todorov, "Organization of Neurosurgical Assistance at Burgas Hospital EOOD for Patients with Spinal Cord Injuries," *Burgas Medical Journal*, ISSN: 2815-4649, Issue 1, 2024, pp. 33-35.

1.2. "Spinal Cord Trauma in Childhood," Todorov S., Miraschijski B., *Spinal Surgery journal*, ISSN: 2815-3642, Volume II, Issues 1-4, 2023.

2. Participation in national congresses and symposia related to the topic of the dissertation:

2.1. S. Todorov, E. Sotirova, Z. Kirovakov, "Investigation of Neurosurgical Operations in Bulgaria Using the Inter-Criteria Analysis Method" — poster at the Third International Symposium on Bioinformatics and Biomed

## Conclusion

The topic of the dissertation "Organization of Neurosurgical Care in Bulgaria - Comparative Analysis" is topical and socially significant. The study meets all the requirements for a scientific work. The results obtained are significant and applicable in practice.

On the basis of the above, I vote POSITIVE regarding the awarding of the educational and scientific degree "Doctor" to Dr. Svetoslav Kirilov Todorov in the professional field 7.1 Medicine in the field of higher education 7 Health and sports, Scientific field "Neurosurgery".

06.05.2025  
Varna

Signature:.....  
Assoc. Prof. B. Iliev, MD, PhD

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