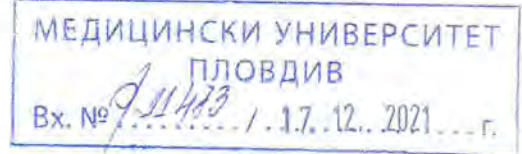


TO THE CHAIRMAN OF THE SCIENTIFIC JURY,
DETERMINED BY ORDER № 2181 / 01.12.2021
OF THE RECTOR OF THE MEDICAL UNIVERSITY PLOVDIV



REVIEW

**on dissertation "Optimizing the resilience of medical institutions for
hospital care to disasters"
for obtaining the ESD "Doctor"
in the scientific specialty "Disaster Medicine"**

by Prof. Dr. Kamen Petrov Kanev, MD, PhD, DSc

Author of the dissertation: Maria Georgieva Georgieva, MD

The submitted for review dissertation "Optimizing the resilience of medical institutions for hospital care to disasters" examines issues related to the readiness of the health care system to respond adequately to situation under the threat of or in the event of a disaster.

Dr. Maria Georgieva Georgieva was born on September 27, 1989 in the town of Krumovgrad. 2008 graduated with honors from Vasil Levski High School in Krumovgrad in a humanitarian class. She speaks English B2. 2015 graduated in medicine at the Medical University - Plovdiv with very good results. Dr. Georgieva actively participated in a circle of surgery and during the studies and practices had improved her skills for the diagnosis and treatment of surgical diseases. Back in her student years she has noted the importance of organization and consistency in the conduct of life-saving activities throughout the provision of first medical aid. The challenges related to the medical support of a large number of victims, which she encountered in the emergency department, are also a factor that contributes to the formation of her interest in disaster medicine. Since 2016, after winning a competition, she has been elected an assistant professor in Disaster Medicine at the Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University, Plovdiv. She is currently a resident in Disaster Medicine postgraduate program. In addition to her teaching activities, Dr. Georgieva is actively involved in scientific- research activity of the Department of Disaster Medicine. She conducts research mainly focused on various aspects related to reducing the vulnerability of medical support in case of disasters, accidents and catastrophes - from the planning number of the necessary medical professionals, their training and specific tasks to be performed in the most frequently reported crisis and disaster situations. Dr Georgieva has presented the results of her research at 19

national and international scientific forums, and has published them in 10 scientific publications in journals and collections. She is a member of the Bulgarian Medical Union, the Union of Scientists in Bulgaria, the Bulgarian Scientific Society of Public Health, the Youth Scientific Society "Asclepius" and the Bulgarian Scientific Society of Epidemiology of Infectious and Non-Infectious Diseases.

From the presented brief biographical data it is evident that the choice of the topic of the dissertation is a consequence of the interest and accumulated by the PhD candidate observations on a highly vulnerable and insufficiently studied element of the medical support system for victims of disasters, accidents and crises.

The research is dedicated to important and current topics - determining the resilience of one of the main components of medical support in disasters, accidents and catastrophes - the hospitals.

The latest scientific developments, as well as the directives adopted at the global forums dedicated to disaster management, raise the issues of increasing resilience and reducing vulnerability as leading strategies for reducing and managing the risk of disasters. The need for such scientific research is evidenced by the increasing frequency of disasters due to the socio-economic and climate changes that are characteristic of our time. In our country, the research on the issues related to the sustainability of hospital care in case of disasters, accidents and catastrophes is not numerous, and those that analyze the situation on a regional scale are isolated, which proves the relevance of the developed topic.

The paper is developed on 168 standard pages, which include 5 tables and 57 figures. The 199 titles included in the bibliography are mostly in Latin - 160, 39 are in Cyrillic, with publications from recent years predominating - 135 (67.8%), which is proof of the relevance of the study.

Structurally, the work meets the requirements for a dissertation - developed in the following chapters: introduction - 2 pages, literature review - 28 pages, purpose and objectives, materials and methods - 8 pages, own results and discussion - 95 pages. , summarized conclusions - 1 page, contributions - 2 pages, used literature - 16 pages, publications related to scientific development, participation in scientific forums - 1 page, applications - 10 pages.

The literature review is presented on 28 pages. It is developed in 4 subsections:

- trends in the development of disasters;
- impact of disasters on the provision of health services;
- disaster resilience;

- resilience of hospitals to disasters.

The selection of literature proves the good theoretical preparation of the doctoral student in terms of planning and conducting research - after identifying the objectively existing fact as the essence of the general problem and its consequences, which logically leads to an assessment of severity and likelihood of negative impact and the analyses of the existing response models with their advantages and disadvantages. An important part is the conclusions of the review related to the possible impacts of disasters on the sustainability of the health care system and medical institutions, in particular, as by them derive the objective and the related tasks.

The literature review is a thorough and complete scientific research with a pronounced contribution character. The in-depth and detailed study of various aspects of the dependence of the sustainability of health systems and its elements on disasters is an example of the contribution of the review. The detailed definition of the elements of the operational component of sustainability should also be noted as a significant theoretical contribution. Based on the results, the PhD candidate forms the conclusions on the basis of which it formulates the purpose of the dissertation and the tasks that will contribute to its achievement. The following conclusions are worth noting:

1. The sustainability of hospitals is still a poorly studied issue, both globally and nationally.
2. Increasing the number and frequency of disasters, which affect the population at risk and pose challenges to the sustainability of the disaster medical support (DMS).
3. As a last step in health care, hospitals need to be able to withstand and respond to disasters, maintain their functioning in crises and be able to recover from their initial condition or to adapt after a disaster, ie. to be sustainable.
4. In the conditions of threatening or occurred disasters, the opportunities for increasing the resilience of drugs are achieved mainly by optimizing the operational component - human resources, the processes of planning and management of medical activities.
5. Increasing the capabilities of the operational component is the basis for increasing the resilience of medical institutions to disasters, accidents and catastrophes.

The detailed analysis allows the doctoral student to identify unresolved issues and new directions of research work in this extremely important for the planning and management of medical care in emergencies and disasters.

Based on the conclusions from the literature review, the purpose of the research is formulated: to analyze the resilience of medical institutions in Plovdiv region in emergencies and opportunities for optimization and impact on

the operational component. To achieve this goal, the following 5 tasks are defined:

- To analyze the disaster situations (DS), which are at increased risk in Plovdiv region;
- To assess the impacts that disaster situations have on the medical establishments for hospital care in Plovdiv district.
- To determine the readiness of hospitals for reaction at DS;
- To analyze the readiness of the staff of the hospitals in Plovdiv district for disaster response; • To propose a program for optimizing the operational component of the sustainability of medical institutions in Plovdiv district to DS.

The goal and tasks are adequately formulated and logically lead to solving the problem. In order to achieve the set goal and tasks, the doctoral student builds a focused methodology of the research, which is correct and presented in detail in the section "Materials and methods" of the second chapter. I define as correct the selection of the object of research, the logical and technical units for observation, as well as the signs for observation - factorial and effective. The organization and conduct of the research meet both the set tasks and the requirements for research. - all necessary permits and consents have been requested and obtained. A number of social and static methods have been used to analyze and process the results of the studies. The documentary method was applied in the collection and analysis of data on disasters, accidents and catastrophes for the period 2015-2019, as well as for the study of documents governing the organization and conduct of DMS in hospitals - orders, response plans for DS. The questionnaire method was used for the collection of primary information by the medical specialists in hospitals, by filling in a paper questionnaire in certain hospitals in Plovdiv region. The study covered 295 medical professionals. The collected primary information was statistically processed and quantitatively analyzed using specialized software SPSS 21.0 for Windows XP. The level of significance of the null hypothesis is considered to be $p < 0.05$.

The following statistical methods were used:

- Alternative analysis;
- Variation analysis;
- Non-parametric analysis - Pearson's agreement criterion (χ^2 -xi-square);
- Correlation analysis;
- Graphic analysis.

In the section "Results and discussion" the own results of the research are presented and discussed in detail and scientifically substantiated, which are thoroughly and relatively interpreted. The results are presented in detail on 95 pages, and each of the five chapters corresponds to the studies conducted to solve a specific task. In this part of the scientific work systematically,

methodologically and consistently the author presents in the necessary completeness the received results from the tasks set for solving.

To solve the first task, in-depth studies of the geographical location, natural and socio-economic features of Plovdiv district were conducted. The results of the research provide grounds for Dr. Georgieva to identify the main hazards that have the potential to cause the development of DS in Plovdiv region, namely the geographical location in the seismically active zone, the presence of water basins, chemical companies and sites of national and European critical infrastructure, the use of radioisotopes, the density and concentration of the population in certain centers. The dissertation proves the high vulnerability of Plovdiv District to disasters, accidents and catastrophes.

Solving the second task is through a detailed study of the impacts that disasters have on hospitals in Plovdiv, which are properly divided into two main groups - direct and indirect impact of damaging factors on hospitals in Plovdiv and the impact of consequences, both for the hospitals itself and for the DMS. The direct impact of DS leads to work in unusual conditions and performing non-routine medical actions. Damages and negative impacts on the two components of resilience have been reported, which seriously hamper the provision of medical care and the conduct of medical care operations for victims. The consequences of the indirect impact - increasing the number of patients for examination and hospitalization, increased workload of diagnostic para-clinical units in the hospital and increase the cost of medicines and consumables is theoretical and justified by practical examples. The results of the research allow the doctoral student to conclude that increasing the readiness of medical staff for an adequate response to DS is the most flexible and affordable way to increase the resilience of hospitals by increasing the capacity and capabilities of the operational component.

Descriptive and comparative analyzes of the disaster response plans of hospitals, located in Plovdiv district and beyond, were conducted in solving the third task. The conclusions from the comparative analysis of the components of the static and operational components of sustainability have a pronounced practical orientation and should serve as a basis for the planning structures for optimization of the prepared plans. I fully support the presented conclusions and the resulting recommendations: in planning to focus on critical engineering infrastructure and resource provision for DMS; revision and in-depth description of standard operating procedures for disaster response; periodic conducting of theoretical and practical training. The set of recommendations listed has the potential to increase the resilience of hospitals to disasters.

The fourth task was solved through a survey prepared and conducted by the author among medical specialists from different types of medical institutions in Plovdiv district. It highlights in detail the six main elements of the operational component of their resilience to disasters. The obtained results are shown and analyzed in a synthesized form, sufficiently illustrated with tables, figures and

diagrams, which in an accessible and understandable way presents the author's reasons for the conclusions. A number of areas have been identified in which, through the planning and implementation of targeted actions, a significant increase in the readiness for an adequate response can be achieved and the vulnerability of hospitals in the event of a threat of disaster or disaster occurrence can be reduced. I support the main directions in which, ways to influence and change should be sought - communication, theoretical and practical training, etc.

From the analysis of the planned and performed research, as well as based on the results obtained, the doctoral student creates and proposes a program consisting of theoretical and practical classes aimed at increasing the capabilities of the operational component for adequate and effective response of the hospital assistance in the event of a threat or an emergency situation, which fulfills the goal set to achieve it. Based on my experience, I highly appreciate the created program and recommend that it be implemented in practice as soon as possible.

The discussion and presentation of the summarized conclusions from the conducted research and analysis of the obtained results indisputably proves that the doctoral student has built the basic skills necessary for a researcher for analysis and synthesis. The derivation of the generalized conclusions in a separate chapter allows to emphasize the significance of the dissertation. These conclusions are the basis of the later scientific-theoretical and scientific-applied contributions. Quite correctly in 10 points Dr. Georgieva pointed out the contributions of confirmatory scientific-theoretical and scientific-applied nature, as well as the 2 contributions that enrich the existing practice and theory of Disaster Medicine.

I accept without remarks the generalized conclusions and believe that the contributions presented by the author enrich the theory and practice of Disaster Medicine.

I have no significant critical remarks regarding the value of the dissertation, there are some technical errors that do not diminish the importance of scientific work.

The abstract is compiled in accordance with the requirements, adequately reflecting the content of the dissertation. The presented three publications, which reflect separate stages of the doctoral student's scientific and creative activity, cover the scientometric requirements for acquiring the educational and scientific degree "Doctor" - of which 1 in Scopus and 1 in Web of Science (in all of the articles the doctoral student is the lead author) one in an international edition, two in Bulgarian scientific journals. The doctoral student presented part of his research during two participations in national scientific forums as a leading author.

I have personal observations about the doctoral student from the beginning of the development of her dissertation. During this time, Dr. Georgieva proved her enduring interest in Disaster Medicine, as well as proven to have grown in terms of approach and development of tasks of scientific-theoretical and scientific-applied nature.


Conclusion

The scientific work presented for review "Optimizing the resilience of medical institutions for hospital care to disasters" is dedicated to a topical issue of Disaster Medicine and crisis management and has a certain scientific value. The structure, the selection and the conducted analysis of the literature sources, the used materials and methods of scientific research, the presented conclusions and summaries, the obtained results and the substantiated proposals are of contributing nature. The volume, content and layout fully meet the requirements for dissertation work for the acquisition of ESD "Doctor".

Based on the above, I give a positive assessment of the work and recommend to the chairman and members of the esteemed scientific jury to vote for the award of educational and scientific degree "Doctor" in Higher Education 7. Health and Sports, Professional 7.1. Medicine, Scientific specialty Disaster Medicine to Dr. Maria Georgieva Georgieva, Assistant Professor in the Department of "Epidemiology and Disaster Medicine" of the Faculty for Public Health, Medical University of Plovdiv.

10.12.2021
Sofia

Reviewer:


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