

## **REVIEW**

**by Prof. Atanas Georgiev Lyondev, PhD - Higher School of Security and Economics - Plovdiv**

of a dissertation work for the award of a scientific degree "Doctor of Science"

in Higher Education Area 3. Social, economic and legal sciences

Professional direction 3.8. Economy

**Author:** Irena Brukvitska, PhD

**Topic:** Impact of economic aspects on the medical industry on the example of the treatment of patients with diabetic foot in Poland

### **1. General description of the presented materials**

By order No. 816 of 12.12.2023 of the Rector of the Higher School of Insurance and Finance, Prof. Boris Velchev, DS, I have been appointed as a member of the scientific jury to ensure a procedure for the defense of a dissertation work on the topic: "Influence of economic aspects on the medical industry on the example of the treatment of patients with diabetic foot in Poland" for the acquisition of a scientific degree "Doctor of Sciences" in the Higher Education Department 3. Social, Economic and Legal Sciences, Professional Direction 3.8. Economy. The author of the dissertation is Irena Brukvitska, PhD - a candidate for the Department of Finance and Insurance.

The materials handed over by Irena Brukvitska, PhD include documents according to the presented inventory: (curriculum vitae, copy of the diploma for the acquired educational and qualification degree "PhD", etc.).

The candidate for Doctor of Sciences has attached: Monograph – 1 piece; Articles and reports published in scientific publications, referenced and indexed in world-famous databases with scientific information - 8 nos. co-authored with Iwona Dudzik; Articles and reports published in non-refereed peer-reviewed journals or published in edited collective volumes - 101 nos. co-authored; Studies published in non-refereed peer-reviewed journals or published in edited collective volumes - 14 nos., of which 11 nos. co-authored; published chapter of a collective monograph – 30 nos.

## **2. Brief biographical data about the candidate**

Irena Katarzyna Brukwicka was born on February 12, 1968 in Wlodawa, Poland. Received diploma No. 1822/24.04.2001 for PhD from 20.06.2000 from the University of Słonia in Katowice, Poland. The topic of the dissertation is: "Socio-economic conditions of the development of alcoholism in the municipalities of the Yaroslavl Region". He completed his master's degree in 1996 at the Medical University of Lublin.

Irena Brukwicka, PhD has extensive experience in applied and fundamental research in the field of health economics. He held various leadership positions as Director of the Institute of Health Care at Bronislav Markevich Higher Technical and Economic School in Yaroslavl and until now, as Director of the Institute of Nursing and Midwifery and Director of University Postgraduate Education for Nurses and Midwives. Participated with reports in 6 scientific conferences in Poland, Slovakia and Ukraine, in 1007 manuals of diploma theses.

## **3. Actuality of the topic and appropriateness of the set goals and tasks**

The dissertation on the topic: "Influence of economic aspects on the medical branch of the example of the treatment of patients with diabetic foot in Poland" consists of 263 pages, including an introduction, three sections, a discussion, a conclusion, a list of used literature and an appendix - a survey. 48 tables, 66 diagrams and 5 figures are presented. The bibliography contains 282 sources, of which 254 are monographs, studies and scientific articles, 8 sources of statistical information, 2 normative sources and 18 other titles (including books, articles, periodical and non-periodical statistical and other publications, reports and online sources). The results of the research are presented in 219 publications.

The relevance of the chosen topic

The relevance and choice of the topic of the dissertation work is associated with the need to study the diabetic foot, which is a severe complication of diabetes mellitus, affecting from several percent to several tens of percent of patients. In addition, proper treatment can prevent amputation, regardless of the fact that it is a long and expensive, but effective method. Time plays a very important role in the successful treatment of diabetic foot syndrome. In order to make a quick diagnosis, there is a need for short-cuts for research and consultation within a practically possible functioning specialized outpatient care. According to the author, which is also a significant scientific contribution, in the context of controversies concerning, on the one hand, the well-being of the patient, the protection of his health, the subjectivity of his rights and the interests of the state budget or institutions - for the author, this topic is very suitable for thorough research.

The main aim of the dissertation is to show the trends in the Polish system of recording the treatment and care of diabetics in the treatment of diabetic foot syndrome (SDF). These trends are related to the priority of medical organizations in the implementation of specific measures for the treatment of patients with the Syndrome. There are many indications that these considerations relate mainly to the economy of the treatment provided. Three research tasks were set, for the solution of which several working hypotheses were raised.

#### **4. Knowing the problem**

The dissertation is a theoretical and empirical analysis of the payment system for diabetes treatment and care for the treatment of diabetic foot syndrome in Poland. The author knows the state of the problem and creatively evaluates the literature material, noting that it would be appropriate to conduct an empirical study consisting of the collection and development of information for the analysis of the payment system for the treatment and care of patients with diabetes mellitus in the treatment of diabetic foot syndrome, as it is of great importance from an economic point of view when choosing treatment methods. This can be expressed in the economy of medical procedures. The state of the health care system in Poland, the underinvestment or debt of many health care institutions, prompts decision-makers to prioritize decisions about treatment options.

#### **5. Research methodology**

Various statistical methods were used to analyze the raw data and test three hypotheses, including descriptive statistics, statistical tests (single mean test, Mann-Whitney U-test, Kraskella-Willis analysis of variance), prediction methods (using exponential smoothing, moving average), etc. Considering the level of significance  $\alpha=0.05$ , the author accepts the following statistical significance:  $p<0.05$  – existing statistical significance;  $p<0.01$  – high statistical significance;  $p<0.001$  – very high statistical significance. The collected data will be useful for those researchers who want to study it in the future to perform more in-depth statistical analysis. The chosen research methodology allows achieving the set goal and obtaining an adequate answer to the tasks related to their solution in the dissertation work.

#### **6. Characterization and evaluation of the dissertation work**

**Section I** is divided into three sub-sections and contains a detailed description at the macro- and micro-level. All data characterizing diabetes mellitus from a medical point of view are presented in an economic context, which significantly burdens the state budget and the patient himself.

The author states that diabetic foot ulcers are one of the leading causes of amputations, hospitalizations and disability worldwide, with approximately 26 million people suffering from an ulcer each year, with another 130 million at risk of peripheral neuropathy, and 4.5 million people are at risk of diabetic peripheral neuropathy.

In **Section II**, a review of the literature was performed and the essence of the phenomenon was investigated from the point of view of the real costs of conservative, surgical and interdisciplinary treatment of SDS. The differences and comparisons between different forms of therapy are presented, as well as the benefits of using alternative forms of therapy over traditional ones. The results of the empirical analysis clearly show that early diagnosis of diabetes mellitus and access to professional interdisciplinary care significantly reduces treatment and health care costs, while minimizing the occurrence and/or delaying costly complications.

In **Section III**, an economic and financial analysis of restored diabetic foot services in Poland was carried out and the verification of the three main hypotheses adopted in the work, tested and summarized in Table 47.

Regarding the first main hypothesis (H1), the results of the hypothesis testing indicated that the economic views in the treatment of SDS influence the treatment organization's decision to amputate a limb. Based on the available and analyzed data, it can be concluded that there is a tendency to increase the number and costs of amputations in Poland. This is confirmed by the data for 2011-2019 (Charts 13 and 14), which are most adequate for assessing long-term trends.

For the second main hypothesis (H2), the results of the hypothesis testing show that the treatment of SFS does not transfer the financial burden at the expense of increasing funding for lower limb amputations. The total amount of different types of benefits paid to disability pensions and social pensions, sickness and rehabilitation benefits, funding of medical rehabilitation as part of disability prevention under the heading of diabetes is systematically decreasing (Chart 32, Table 39).

In the third main hypothesis (H3), the results of the hypothesis testing show that there is an increase in the direct costs of treating patients with diabetes as a result of SDS complications and the amputation required to complete the procedure, but in terms of indirect costs only in some aspects, the complications of SDS treatment affect their increase. Regarding intangible costs, understood as changes in the quality of life, in the group of patients with SDS they were lower than in the group of patients without this complication.

The reliability of the source information used, the methodology used, have allowed the author to illustrate his hypotheses, draw the relevant conclusions and thus build the contributing points in his dissertation work.

## 7. Contributions and significance of the development for science and practice

### Scientific contributions

- The expediency of an empirical study on the applied methods for the treatment of diabetic onset syndrome (DDS) and economy of treatment procedures in diabetics
- Combining statistical methods with a questionnaire to assess the consequences of SDS and assess their impact
- For the first time, economic considerations in the use of SDS are shown to help influence the decision to amputate a limb.

### Scientific and applied contributions

The candidate's contributions are particularly relevant for practice and are a good prospect for future development and solution of the research problem.

- Research shows that the NHS promotes a policy of too many amputations because it pays more to amputate the affected leg than the actual cost of conservative therapy. *Early diagnosis and professional control of diabetes mellitus is a tactic that can significantly reduce the burden of diabetes and its complications on the national budget.* The cost of treating complications greatly exceeds the cost of prevention. Health-promoting behaviors reduce risk and delay the onset of disability in patients.
- *Prevention of amputations involves effective, intensive and individualized educational efforts as a tool to reduce the cost of diabetes treatment, which should be a priority.*
- There needs to be general reimbursement for advanced diabetic treatments while maintaining clearly defined eligibility criteria to ensure positive therapeutic benefits. *Reimbursement for optimal modern treatments should not be seen as an expense, but as an opportunity and investment.*
- The results of the author's study have important implications *for prioritization and resource planning and for informing decision makers, which may affect economic costs to the patient and government.*
- *Primary and secondary prevention of complications, early detection of diabetes mellitus and interdisciplinary monitoring of diabetes mellitus should become priorities to reduce costs in a broad sense.*

## 8. Evaluation of publications on the dissertation work

The publications with which the candidate Brukvitska, PhD participates in the procedure for the Doctor of Sciences can be classified according to different signs.

The list of publications presented in the Reference for the minimum requirements for the scientific degree "Doctor of Science" in professional direction 3.8 Economics is a total of 603.48 points:

- Monograph – 1 pc.;
- Articles and reports published in scientific publications, referenced and indexed in world-famous databases with scientific information - 8 nos. co-authored with Iwona Dudzik;
- Articles and reports published in non-refereed peer-reviewed journals or published in edited collective volumes - 101 nos. co-authored;
- Studies published in non-refereed peer-reviewed journals or published in edited collective volumes – 14 nos., of which 11 nos. co-authored and
- Published chapter of a collective monograph – 30 nos.

The candidate submits a Reference for the minimum national requirements for the scientific degree "Doctor of Science" with a total of 73 citations with 3,170 points:

- Citations or reviews in scientific publications, referenced and indexed in world-renowned databases with scientific information or in monographs and collective volumes - 480 points
- Citations in published scientific works, monographs and peer-reviewed collective volumes – 2660 points
- Citations or reviews in non-refereed peer-reviewed journals – 40 points.

The total number of publications and citations is impressive and refers to the period since the acquisition of the scientific degree "doctor" in 2000, being dedicated to research in the field of health economics and more specifically to research in the dissertation problem. Publications are in Polish and English. The in-depth analysis of the candidate's scientific output shows that there is a variety of scientific and scientific-applied developments and achievements, evaluated as a whole. In their unity, they objectively reflect the applicant's research abilities and capacity, meeting the requirements of PPZRASRB, which gives me reason to confirm the conclusion that Brukvitska, PhD has fulfilled the condition for a doctor of sciences in professional direction 3.8 Economics.

## **9. Assessment of compliance with minimum national requirements**

The submitted Certificate of fulfillment by the candidate of the minimum national requirements for obtaining the scientific degree "Doctor of Sciences" in the professional direction 3.8. Economics meets the requirements for the application of the ZRASRB.

## **10. Personal participation of the candidate**

Obtained results of the conducted dissertation research and formulated contributions by the candidate are his personal credit. I did not find any plagiarism in the evaluated dissertation work.

## **11. Abstract**

The content and quality of the abstract are made according to the requirements of the relevant regulations and reflect the main results achieved in the dissertation work.

## **12. Critical remarks and recommendations**

I have no critical remarks on Brukwicka's candidacy.

## **13. Recommendations for future use of dissertation contributions and results**

My recommendation is that he continues his research work and offers new scientific solutions that find application in medical policy and practice.

## **CONCLUSION**

The dissertation contains scientific, scientific-applied and applied results, which represent an original contribution to science and meet all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB) and the Regulations for the Implementation of ZRASRB. The presented materials and dissertation results fully comply with the specific requirements of the Rules for the terms and conditions for obtaining the scientific degree "Doctor of Sciences" at the Higher School of Insurance and Finance.

The dissertation work shows that the candidate, Irena Brukvitska, PhD has in-depth theoretical knowledge and professional skills in Professional Direction 3. 8. Economics, demonstrating qualities and skills for independent conduct of scientific research.

Due to the above, I confidently give my positive assessment of the conducted research, presented by the above-reviewed dissertation work, abstract, achieved results and contributions, and I propose to the honorable scientific jury to award the scientific degree "Doctor of Sciences" to Irena Brukvitska, PhD in Field of higher education 3. Social, economic and legal sciences; Professional direction 3. 8. Economics.

11.01.2024

Reviewer: .....

Prof. Atanas Lyondev, PhD