



DIGITIZATION PROCESSES IN SLOVAK HEALTHCARE SECTOR – THE ISSUE OF SLOVAK DOCTORS AND NURSES

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Abstract

One of the main health policy initiatives in European Union countries is the transition from a patriarchal medical model to a co-managed and integrated approach of personalized healthcare. The 2030 Agenda elements implementation for Health and Quality of Life in terms of technological advances enables the of healthcare delivery optimization. The impact of the elements of digital health and care can be observed on the patient care delivery side and also on the healthcare professionals' performance side. It has the potential to contribute to reducing, in particular, preventable and avoidable mortality, which represent large economic losses in terms of lost productive years. This study focuses on the assessment of job satisfaction with digitalization among doctors and nurses working in hospitals. The research was conducted through a questionnaire survey. The respondents were doctors and nurses working in hospitals in Slovakia. The study evaluates the satisfaction of doctors and nurses with the digitization of work according to the basic characteristics of the respondents by means of correspondence analysis. The goal of the study is to investigate the bureaucratic burden of nurses and doctors regarding digitalization of work in health care institutions as a modern society development prerequisite based on smart technologies. The research was conducted on primary data collected between April 2022 and November 2023 through a questionnaire survey among doctors and nurses working in Slovak hospitals as part of the research task of the APVV 19-0579 project. Forty hospitals in Slovakia were contacted and the sample consisted of 212 doctors and 752 nurses. The normality of the data distribution was carried out by means of histogram and Gaussian curve when being found out to be not normally distributed. Subsequently, they were analysed through descriptive statistics and correspondence analysis. Correspondence analysis was used to investigate the relationship between digitization and administrative burden to the basic characteristics of the respondents, and the relationships were visualized through a correspondence map. The impact of digitization of work and administrative burden is to be also analysed, as smart healthcare elements should have a positive impact on reducing or simplifying administration within the work of doctors and nurses. The results have revealed that, both doctors and nurses lack application of new technologies that along with digitization of work in medical practice bring up a lot of benefits. The results of the study highlight the importance of digital transformation in healthcare, identifying the impact of technologies usage on various aspects of medical practice, such as speed and accuracy of diagnosis. Elements of digitization implemented into healthcare systems bring a modernization effect and faster data availability to the daily work of doctors and nurses. However, the impact on job satisfaction is insufficient and makes precisely the opposite perception. The conclusion is that the administrative burden has not changed significantly despite the digitization of several administrative activities in healthcare and still remains a significant issue, which can also be considered as a challenge for policy makers.

KEY WORDS: Digitization of healthcare, Internet of Things, working conditions, doctors and nurses, Agenda 2030

JEL: F66, J45, I11

Introduction

Based on the processing of the literature review, we conclude that the healthcare sector, among other professions, is also facing digitalization. However, the Slovak healthcare sector has long been haunted by excessive overload of bureaucratic tasks in both nursing and medical practice. The literature and its findings demonstrate that the level of technological progress enables the implementation of smart technologies to facilitate work and reduce bureaucracy. Another significant benefit of new technologies and digitization within the doctors' and nurses' work is the healthcare services personalization, which is to be tailored to the specific customer - the patient, especially in the field of preventive healthcare and faster sorting out of patients with regard to the health problem severity. Telemedicine and chatbot primary diagnostics could help to achieve this. Researchers dealing with this issue demonstrate just this kind of significant relationship. Taking into account the findings, we form the premise of the need to investigate the level of digitization of work in health care institutions in Slovakia. The goal of the paper is to investigate the bureaucratic burden of nurses and doctors in the context of digitization of work in healthcare institutions as a

prerequisite for the development of a modern society based on smart technologies.

Literature review

A smart city is a sustainable city dealing with urban problems and improves the quality of life of citizens through the fourth industrial revolution technology elements and the management among stakeholders. As a result of rapid urbanization, smart cities are emerging to solve urban issues in various sectors such as healthcare, transportation, environment, welfare, economy, security, energy and efficient distribution of urban resources. Smart technology is the basis for providing various services through devices to which ICT capabilities are used while supporting various applications in a wide range of fields such as healthcare, education, commerce, agriculture and manufacturing (Samarakkody 2022; Myeong 2022; Alabdali 2023). In this process, city and municipal governments play an important role by integrating smart services into all application domains including healthcare, transportation, clean and green technologies, entertainment and leisure facilities, and crowd management (Hashem et al. 2023). Policy makers in countries are working to implement smart city concepts at the regional levels. Information and communication technologies in various forms need to be implemented in

such cities (Sharif and Pokharel 2022). Smart cities are complex entities that integrate multiple systems to support the human lifecycle. These systems also include smart healthcare (Badidi 2022). The first wave of smart cities was focused on the concept of using next-generation information technologies, such as IoT infrastructure, cloud computing, big data, and geospatial information integration, to support smart city planning, construction, management, and services (Liu, Wiu 2023). Progress evaluation is a challenge because not every city or country has the means to measure performance by using defined indicators (Karal, Soyer 2023). Related to the Smart City, its health-oriented goals, there is the 2030 Agenda, which has an explicitly defined goal for healthcare sector, such as (SDG 3) "Good Health and Wellbeing" that includes nine partial goals. Specifically, these are to improve health and well-being outcomes as well as to reduce health care costs. Several authors suggest a lifelong approach to health literacy, which requires a long-term effort. In addition, the health and healthcare agenda is part of the sustainable development field, which addresses its underlying determinants (Christie, Ratzan 2019; Bowen, et al. 2021).

Maintaining or restoring health is a major task of the health care system, which is carried out under monetary constraints and increasing staff shortages (Diebel-Fischer 2022). In today's world of wireless communication networks, Fog Computing and Internet of Things (IoT) are important technologies for smart healthcare applications and for the development of safety networks (Tripathy, et al. 2022). The interaction of EHRs between different process components, the value added created complemented by CPS, furthermore the interaction of humans with electronic devices monitoring biophysical functions and new business frameworks in healthcare are bringing the concept of Industry 4.0 into healthcare referred to as Health 4.0 (Tupá, Masárová, Karbach 2020). The Fourth Industrial Revolution presents challenges in healthcare, which brings with it many positive elements. Specific challenges associated with Industry 4.0 specifically for healthcare are: patient self-diagnostic systems, patient monitoring, digital data archive, use of artificial intelligence, coordination and collaboration (Krčméry, Papulová 2020; Martinkienė, et al. 2021; Mura, et al. 2022). Digital technologies have a profound impact on all areas of modern life, including the workplace. Some forms of digitisation require the simple exchange of digital files for paper, while more complex cases involve machines performing a wide range of tasks on behalf of humans (Sætra, Fosch-Villaronga 2021). Maintaining or restoring health is a major task of the health care system, which is carried out under monetary constraints and increasing staff shortages (Diebel-Fischer 2022). The Internet of Things (IoT) has emerged in recent years as a significant technology for health service systems (Onesimu 2021). The potential of Internet-of-Medical-Things (IoMT) technology to connect biomedical sensors in eHealth has improved people's standard of living (Kumar, Chand 2020). Medical devices can be connected to health information technology systems through networked technologies to provide quick access to medical data. This interconnection, known as IoMT connects medical devices and applications (Kashyap, et al. 2022). Patients are more actively involved in the decision-making

process and IoMT enables faster diagnosis through the collection of large-scale medical data. However, in all of this, confidentiality, security, and quick responses are taken into consideration when exchanging sensitive medical data (Ksibi, et al. 2023). Traditional healthcare institutions have recognized the need to innovate their workflow, yet there is a great deal of uncertainty about digitization (Tripathy, et al. 2022).

Methodology

The goal of the study is to explore the bureaucratic burden of nurses and doctors in terms of digitization of work in healthcare institutions as a prerequisite for modern society development based on smart technologies.

Partial objectives:

- Literature analysis - Web of science, summary and definition of the selected areas issues,
- Collection of respondents' answers,
- Respondents' answers analysis,
- Questionnaire responses processing,
- Questionnaire results interpretation.

Elaboration tasks of analytical part:

- To find out whether there is a relationship between the educational attainment of nurses and their satisfaction with bureaucratic job factors among nurses,
- To find out whether there is a relationship between the educational level of nurses and their satisfaction with the digitization of work among nurses,
- to find out whether there is a correlation between the specialization of doctors and their satisfaction with bureaucratic factors in the work of doctors,
- to find out whether there is a correlation between the specialization of doctors and their satisfaction with the digitization of doctors' work.

Research data was collected through a questionnaire survey of doctors and nurses. This questionnaire was distributed between April 2022 and November 2023. The questionnaire was developed in terms of the project APVV 19-0579, which dealt with the setup of personnel management processes in hospitals and its impact on the migration of doctors and nurses to work abroad as well as the project VEGA 1/0691/22, which dealt with the economic aspects of emigration of university graduates in medical disciplines in terms of the sustainability of healthcare institutions staffing in Slovak Republic.

The first part of the questionnaire was focused on the basic characteristics of the respondents and on information regarding the health facilities where they worked. The second part was dealing with the respondents' satisfaction ratings with the staff management processes in hospitals. The questionnaires were distributed online through the Google Forms platform and were addressed directly, by reaching out to hospital management. The sample of respondents consisted of 212 doctors and 752 nurses.

To process the results the method of correspondence analysis was used. This statistical method is used to analyze the relationships among data categorical variables. Its use is appropriate when analyzing responses from questionnaire surveys and other types of data, where the variables have categorical or nominal distributions. To confirm the results of correspondence analysis data, there

is a correspondence map serving as a visual representation of the results. The correspondence map contains the variables that have been analyzed and are displayed as points in graphical space. The distance between the variables (points) on the map determines the tightness of the relationship of the points. The closer the variables are on the correspondence map, the tighter their relationship is. The STATISTICA program was used to analyze the data.

Results

Based on the defined main objective, which is to investigate the bureaucratic burden of nurses and physicians in terms of digitalization of work in health care institutions as a prerequisite for the development of a modern society based on smart technologies, the

correspondence analysis was used to assess how selected background characteristics of respondents influence their satisfaction with work factors such as bureaucratic burden and data digitalization. The selected background characteristics of physicians include their successful completion of attestation (specialty) training. We were also focused on the basic identifying characteristics of nurses, specifically their level of educational achieved.

The analysis of bureaucratic burden and digitization of nurses' work in healthcare institutions in Slovakia

In the first part, the relationships between bureaucratic burden and nurses' educational achieved are to be analyzed. The nursing profession is closely linked to the bureaucratic procedures they have to follow, which result from the work tasks related to this job position (Tab.1).

Table 1. Relative frequencies of nurses' responses to the analysis of education and bureaucratic burden

	Percentage of total (nurses_Data)					Total
	Variables in rows: education(3)					
	Variables in columns: bureaucracy(5)					
	1	2	3	4	5	
1	10,94793	12,41656	5,87450	1,735648	0,400534	31,3752
2	8,94526	8,67824	4,80641	2,269693	0,133511	24,8331
3	16,42190	17,22296	7,74366	1,735648	0,667557	43,7917
Total	36,31509	38,31776	18,42457	5,740988	1,201602	100,0000

* Variables in rows (level of education achieved): 1 - secondary vocational education; 2 - higher education/university degree - Bc.; 3 – higher education/university degree - Master. Variables in columns (bureaucratic burden) 1 - completely dissatisfied; 2 - rather dissatisfied; 3 - neither satisfied nor dissatisfied; 4 - rather satisfied; 5 - completely satisfied.

Source: Author's processing by STATISTICA outputs, 2023

The resulting χ^2 test value is 7.73849 at a freedom degree number $df=8$ ($p=0.4594$). This shows that there is no significant relationship between the level of education achieved of nurses and bureaucratic burden at the selected significance level of $\alpha=5\%$.

However, regarding the percentage distribution, the level of bureaucratic burden is distributed according to the nurses' education achieved as follows: nurses with the highest education level (higher education level (HE) Master) - are the most dissatisfied with the bureaucratic burden. After summing the percentage data of the rating within completely dissatisfied and rather dissatisfied is 33.6%. For nurses with HE level I (Bc.) education, 17.6% are dissatisfied with bureaucracy. Nurses with secondary level of education total 23.4% are dissatisfied with bureaucracy; 74.6% of the total respondents expressed dissatisfaction of nurses with bureaucratic burden at work.

The correspondence map (Fig. 1) signifies the strongest relationship for the level of dissatisfaction with bureaucracy and HE level II Master degree, as well as secondary education and the variable rather not (rather dissatisfied) with bureaucratic burden. The scores that indicate both satisfaction but also indecision in determining satisfaction with this factor of work have the biggest distance from the scores of education levels

indicating that there is the weakest relationship among these variables.

The rationale for this perception is the fact that nurses who achieved HE I (Bc.) were full-time students of bachelor's degree programs in nursing who, after completing their education, entered the labor market and were employed as nurses in health care institutions and pursued next studies in an part time form. They have been employed for a short period of time and therefore their perception of the bureaucratic burden at work is less intense than that of nurses with a secondary vocational education who have been working in the system for decades, as well as nurses with a university degree II Master. These two categories have been in the health system longer and therefore perceive the changes more intensely.

Eliminating elements of bureaucracy in healthcare and supporting nurses by digitizing their work is a priority for modernizing the sector. The use of electronic health records, e-prescribing, electronic systems for managing and scheduling work services, health apps. Selected examples show that digitization in different countries is helping nurses to facilitate their work, reduce bureaucracy and deliver quality care to patients more efficiently using new technological approaches.

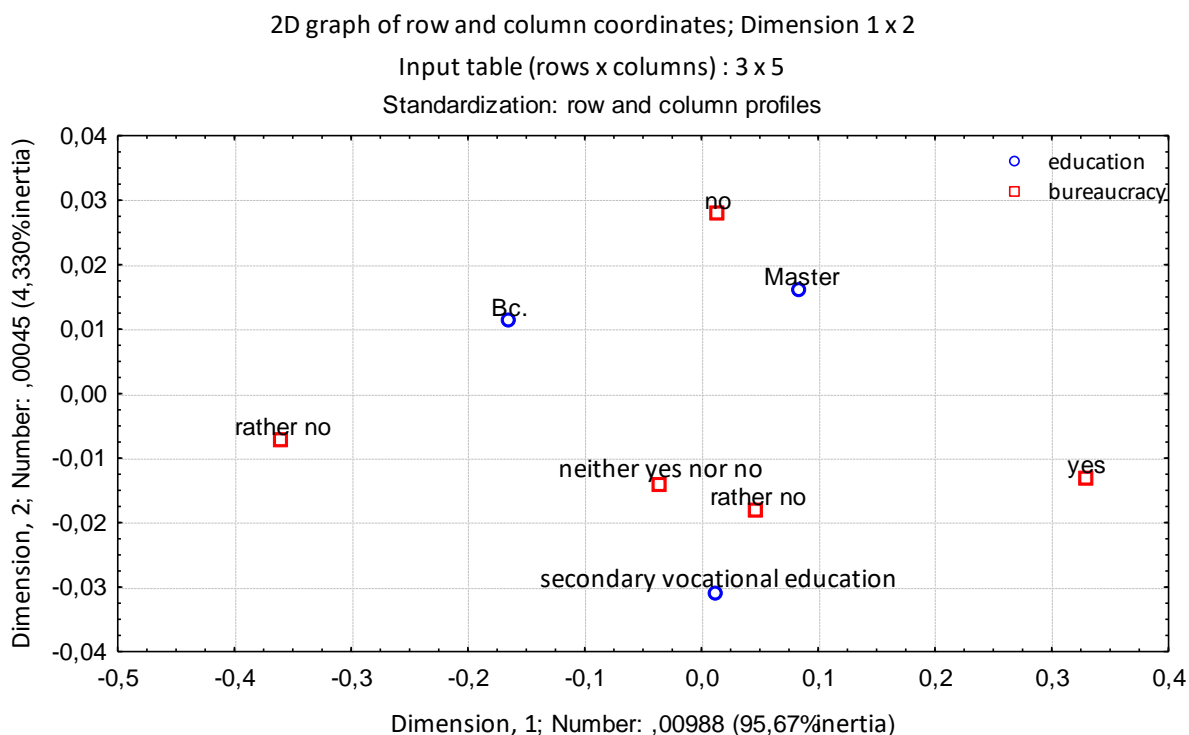


Fig. 1. Correspondence map to analyze the nurses' education and the bureaucratic burden level
 Source: Author's processing by STATISTICA outputs, 2023

Table 2. Relative frequencies of nurses' responses to the analysis of education and digitalization of work

	Percentage of total (nurses_Data)					Total
	Variables in rows: education(3)					
	Variables in columns: digitalization of work (5)					
	1	2	3	4	5	
1	3,60481	5,60748	9,74633	8,27770	4,13885	31,3752
2	4,00534	6,00801	6,14152	5,74099	2,93725	24,8331
3	5,60748	8,41121	10,94793	14,15220	4,67290	43,7917
Total	13,21762	20,02670	26,83578	28,17089	11,74900	100,0000

* Variables in rows (level of education achieved): 1 - secondary vocational education; 2 - higher education/university degree - Bc.; 3 – higher education/university degree - Master. Variables in columns (digitization of work) 1 - completely dissatisfied; 2 - rather dissatisfied; 3 - neither satisfied nor dissatisfied; 4 - rather satisfied; 5 - completely satisfied.

Source: Author's processing by STATISTICA outputs, 2023

The resulting χ^2 test value is 11.0132 at a freedom degree number $df=8$ ($p=0.2010$). This shows that there is no significant relationship between nurses' level of education achieved and their job satisfaction with digitization at the selected significance level $\alpha=5\%$.

In percentage comparison, it can be observed that the highest level of satisfaction with the digitization of work is among nurses with the highest educational degree, namely 18.8%. 39.9% of the total respondents are rather satisfied and completely dissatisfied after summing the percentage data. As many as 26.8% of the total number are unable to express their level of satisfaction with digitization of work. 33.3% are dissatisfied with the digitization of work for nurses (Tab. 2).

In Fig. 2, it can be observed the following relationships of variables: respondents with a secondary vocational education have the strongest relationship with an indecision attitude towards job satisfaction with digitization. Quite strong relationship this variable has with complete satisfaction. Also, a strong relationship can be identified for university-educated level I nurses (Bc.) with dissatisfaction with digitization of work. Respondents with II. education degree (Master) has the strongest relationship with the variable: rather satisfied with the digitization of nurses' work.

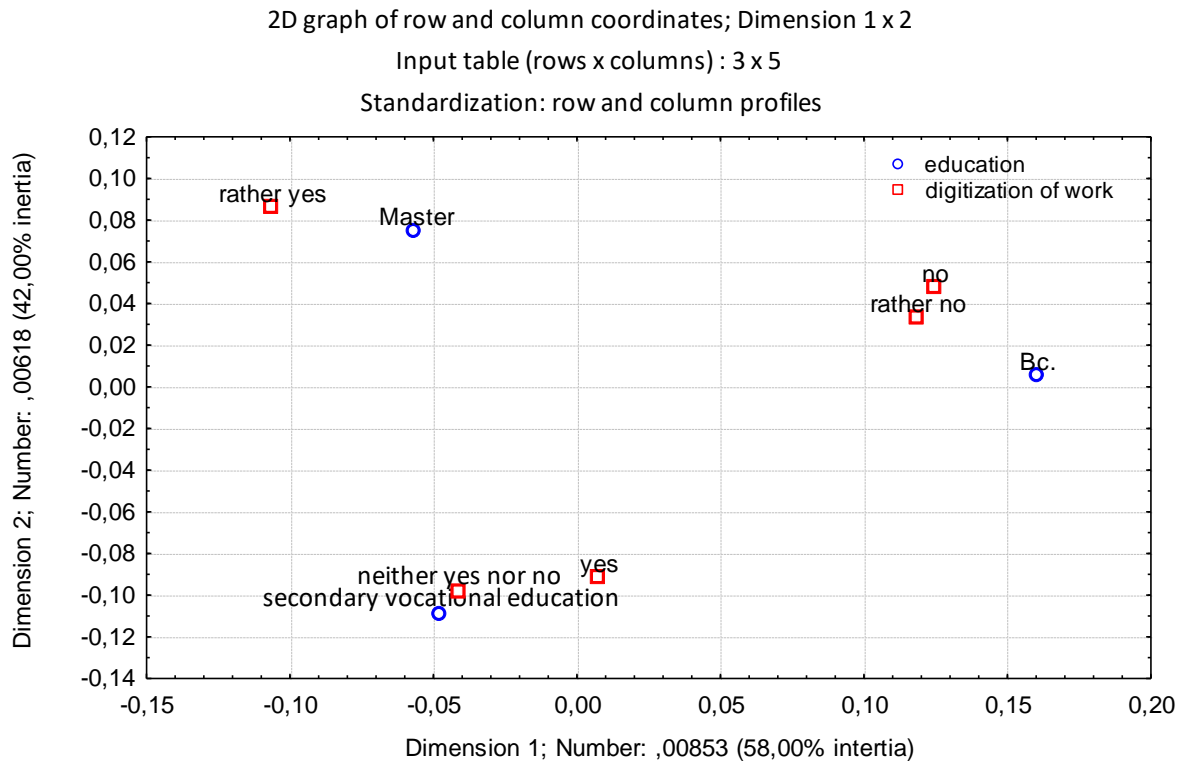


Fig. 2. Correspondence map to analyze the education and the digitization of nurses' work
 Source: Author's processing by STATISTICA outputs, 2023

Table 3. Relative frequencies of nurses' responses to the analysis of bureaucratic burden and the digitization of work

Percentage of total (nurses_Data)						
Variables in rows: bureaucracy (5)						
Variables in columns: digitalization of work (5)						
	1	2	3	4	5	Total
1	8,81175	7,20961	8,27770	9,07877	2,93725	36,3151
2	3,33778	9,21228	11,34846	11,08144	3,33778	38,3178
3	0,93458	2,40320	6,40854	6,00801	2,67023	18,4246
4	0,13351	1,06809	0,80107	2,00267	1,73565	5,7410
5	0,00000	0,13351	0,00000	0,00000	1,06809	1,2016
Total	13,21762	20,02670	26,83578	28,17089	11,74900	100,0000

* Variables in rows (bureaucratic burden): 1 - secondary vocational education; 2 - higher education/university degree - Bc.; 3 – higher education/university degree - Master. Variables in columns (digitization of work) 1 - completely dissatisfied; 2 - rather dissatisfied; 3 - neither satisfied nor dissatisfied; 4 - rather satisfied; 5 - completely satisfied.

Source: Author's processing by STATISTICA outputs, 2023

The resulting value of χ^2 test is 127.924 at the freedom degree number $df=16$ ($p=0.000$). Hence, there is a significant relationship between bureaucratic burden and digitization of work at the selected significance level $\alpha = 5\%$.

Of the total respondents, as many as 39.9% of nurses are rather satisfied with the digitization of work. In terms of the number of respondents it can be considered a positive aspect. However, the bureaucratic burden of nurses is proving to be a real problem. This is evident from the results where the percentage is 74.64% after adding the variables (rather dissatisfied and completely dissatisfied). The results of the analysis point out to the fact that satisfaction with digitization is higher among nurses in

contrast to the bureaucratic burden, which is not significantly eliminated according to the data.

The correspondence map (Fig. 3) shows the following relationships: based on the distribution of points on the map, nurses are dissatisfied with the digitization of work, but they are more dissatisfied with the bureaucratic burden that should be eliminated through digitization and computerization. Nurses perceive development opportunities in the use of modern technologies in other sectors or in foreign health care institutions, but in Slovakia they perceive the absence and insufficient implementation of new technologies in the field of health. Examples of countries that are successfully managing

digitization and modernization of healthcare sector are the Baltic States such as Estonia and Lithuania.

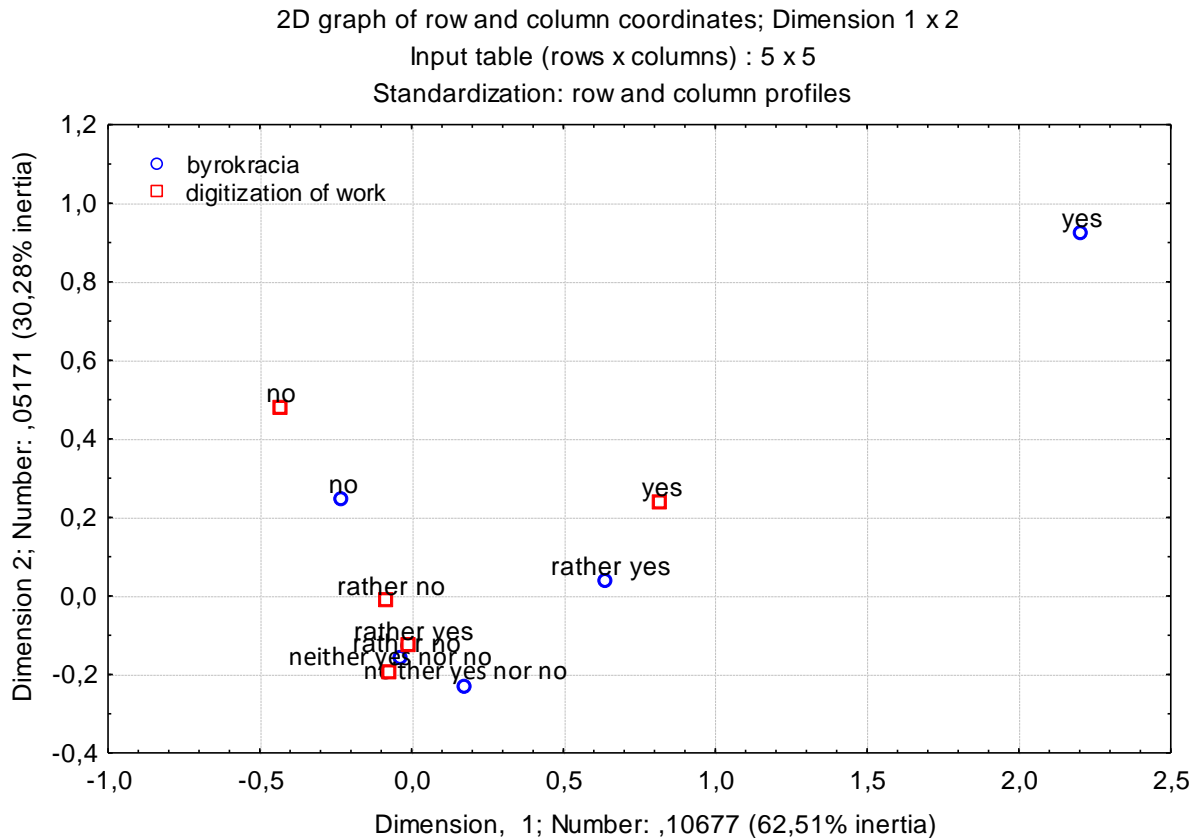


Fig. 3. Correspondence map to analyze the job satisfaction factors of nurses - digitization of work and the bureaucratic burden

Source: Author's processing by STATISTICA outputs, 2023

Case Evaluation: Correspondence analysis did not show a significant relationship when examining the relationship between education achieved and satisfaction with bureaucratic burden. However, the correspondence map depicted relationships of variables that are related. In case of examining the relationships of education achieved and satisfaction with digitization of work, the correspondence analysis did not show a significant relationship. The correspondence map shows the strength of the relationships among the variables. A significant relationship was determined by correspondence analysis of the following relationships: bureaucratic burden and digitization of nurses' work. The results clearly show that the satisfaction of digitalization is at a relatively adequate level, in contrast to the bureaucratic burden, which cannot be removed from the health system even after the application of modern technology in the form of digitalization.

It can be assumed that the digitization of work has not completely removed massive elements of bureaucratic burden. In healthcare, the process, conceptualized as the use of information and communication technologies to support clinical practice, has been developed more slowly than in other economic sectors (Neumann, et al., 2021). A major challenge for healthcare delivery is maintaining or restoring health with limited financial resources and a growing shortage of healthcare personnel. In this context, digital transformation should encompass aspects of

healthcare and help to improve and streamline the work of healthcare professionals (Diebel-Fischer 2022).

In particular, the ability to apply new working methods through digitization should help to simplify and modernize work. It is evident from the respondents' answers that digitization should facilitate their work and speed up the various processes of information distribution. On the contrary, bureaucracy unnecessarily burdens nurses, where their attention should rather be paid to patients. In this respect, it can be argued that the level of digitization has not yet been fully embedded in healthcare system; hence their dissatisfaction. However, the level of satisfaction with the digitization of work is higher, in contrast to the bureaucratic burden, which is perceived very negatively.

The dependent variables level analysis: bureaucratic burden, digitalization of data and specialty level of doctors

The second important group for examining the relationships is doctors. As with nurses, adherence to administrative procedures is essential for doctors due to the nature of their work. Therefore, in this section, we will examine the variables: doctors' specialty in relation to bureaucratic burden and digitalization of work.

Table 4. Relative frequencies of doctors' responses to the analysis of specialty and bureaucratic burden

	Percentage of total (nurses_Data)					
	Variables in rows: specialty (2)					
	Variables in columns: bureaucracy (5)					
	1	2	3	4	5	Total
1	8,05687	8,53081	2,84360	1,895735	0,473934	21,8009
2	30,80569	27,48815	17,06161	2,369668	0,473934	78,1991
Total	38,86256	36,01896	19,90521	4,265403	0,947867	100,0000

* Variables in rows (speciality): 1 - without speciality; 2 - with speciality. Variables in columns (bureaucratic burden): 1 - completely dissatisfied; 2 - rather dissatisfied; 3 - neither satisfied nor dissatisfied; 4 - rather satisfied; 5 - completely satisfied.

Source: Author's processing by STATISTICA outputs, 2023

The χ^2 value of the test is 5.24417 at the freedom degree number $df=4$ ($p=0.2632$). The results of the correspondence analysis indicate that there is no significant relationship between the variables at the chosen significance level $\alpha=5\%$.

Doctors with a specialty are significantly dissatisfied with bureaucratic burden. In the current era of staff shortages in healthcare sector, it is important for health

professionals to facilitate and simplify work processes. This statement is confirmed by the percentage of dissatisfaction with bureaucratic burden. As many as 58.3% of the respondents with specialty are rather dissatisfied and completely dissatisfied with the selected factor (Tab. 4).

Table 5. Relative frequencies of doctors' responses to the analysis of specialty and digitalization of work

	Percentage of total (table_doctors)					
	Variables in rows: specialty (2)					
	Variables in columns: digitalization (5)					
	1	2	3	4	5	Total
1	2,84360	5,68720	9,95261	2,84360	0,473934	21,8009
2	9,47867	13,74408	31,27962	18,00948	5,687204	78,1991
Total	12,32227	19,43128	41,23223	20,85308	6,161137	100,0000

* Variables in rows (speciality): 1 - without speciality; 2 - with speciality. Variables in columns (digitization of work): 1 - completely dissatisfied; 2 - rather dissatisfied; 3 - neither satisfied nor dissatisfied; 4 - rather satisfied; 5 - completely satisfied.

Source: Author's processing by STATISTICA outputs, 2023

The result of the χ^2 test is 4.88291 at the freedom degree number $df=4$ ($p=0.2995$). The results of the correspondence analysis show that there is no significant relationship between the variables at the chosen significance level $\alpha=5\%$.

Doctors with a specialty are significantly more satisfied with the digitization of work compared to doctors without a specialty. A total of 23.7% of doctors with specialty are satisfied with the digitalization of work. However, 31.6% of the total respondents are rather dissatisfied and completely dissatisfied with digitization of work. 41.2% cannot express an opinion on satisfaction with digitization of work and 27% of the total respondents are rather satisfied and completely satisfied with digitization (Tab. 5).

The value of the χ^2 test result is 44.6364 at the freedom degree number $df=16$ ($p=0.0002$). The results of the correspondence analysis show that there is a significant relationship between the variables at the chosen significance level of $\alpha=5\%$.

The results of the correspondence analysis show that 27.01% of the doctors are rather satisfied and completely satisfied with the digitization in healthcare facilities. We can observe negative attitudes in the evaluation within the level of bureaucratic burden. As many as 74.88% of the total number of doctors being surveyed are significantly dissatisfied with the selected factor of work (Tab. 6).

Table 6. Relative frequencies of doctors' responses to the analysis of bureaucratic burden and digitization of work

	Percentage of total (table_doctors)					Total
	Variables in rows: digitalization (5)					
	Variables in columns: bureaucracy (5)					
	1	2	3	4	5	
1	9,95261	0,94787	1,42180	0,00000	0,00000	12,3223
2	9,95261	5,21327	2,84360	0,947867	0,473934	19,4313
3	12,79261	17,26161	10,42654	0,947867	0,00000	41,2322
4	4,73934	10,42654	3,79147	1,895735	0,00000	20,8531
5	1,42180	2,36967	1,42180	0,473934	0,473934	6,1611
Total	38,86256	36,01896	19,90521	4,265403	0,947861	100,0000

* Variables in rows (digitization of work): 1 - completely dissatisfied; 2 - rather dissatisfied; 3 - neither satisfied nor dissatisfied; 4 - rather satisfied; 5 - completely satisfied. Variables in columns (bureaucratic burden): 1 - completely dissatisfied; 2 - rather dissatisfied; 3 - neither satisfied nor dissatisfied; 4 - rather satisfied; 5 - completely satisfied.

Source: Author's processing by STATISTICA outputs, 2023

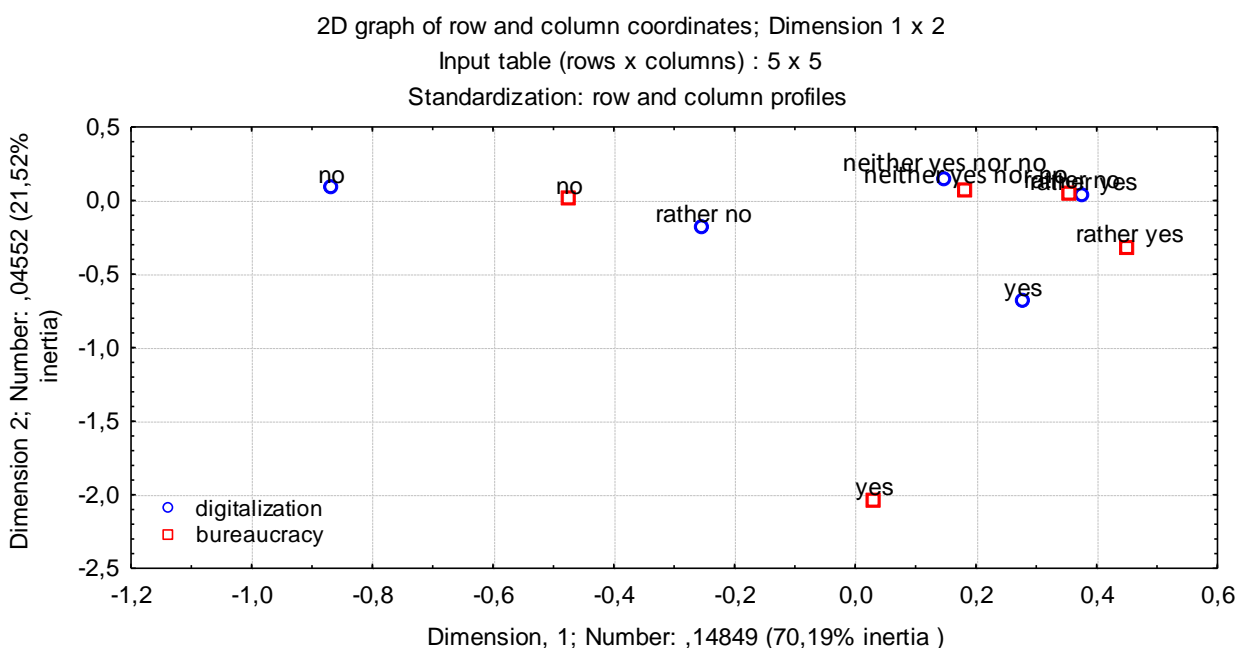


Fig. 4. Correspondence map to the analysis of doctors' job satisfaction factors - digitalization of work and bureaucratic burden

Source: Author's processing by STATISTICA outputs, 2023

Correspondence analysis (Fig. 4) shows the following relationships: based on the distribution of points on the map, doctors are more satisfied with the digitization of work, but they are more dissatisfied with the bureaucratic burden, which has a negative effect on the performance of doctors. The closest relationship was found in these aspects. The correspondence map confirms the results of the correspondence analysis, which shows that relatively respondents are satisfied with digitization, but the bureaucratic burden can be perceived from their statements as a hindrance to the performance of the medical profession. In particular, the biggest problem of administrative tasks lies in the time frame and inefficient management of documentation.

Discussion

Correspondence analysis did not show a significant relationship when examining the relationship between physicians' specialty and satisfaction with bureaucratic burden. In case of examining specialty of doctors and satisfaction with digitization of work, the correspondence analysis did not show a significant relationship. The correspondence map shows the strength of the relationships between the variables namely: the factors that influence satisfaction with the report. However, the correspondence map depicted the relationships of variables that are related to each other. Overall, it can be summed up that doctors with specialty show more satisfaction with digitalization of work compared to bureaucracy. However, dissatisfaction with bureaucratic burden should highlight the need to reduce administrative burden and improve working conditions for these

healthcare professionals. A significant relationship among the variables was demonstrated by correspondence analysis when comparing the variables: bureaucratic burden and digitization of work of doctors. The results of the analyses point out to the fact that, as in case of nurses, the expansion and application of new technologies is absent in case of doctors. New technologies and the digitalization of work in medical practice bring them a number of advantages. Some of the benefits of digitization are described in their publications as follows:

Kuhn, Jungmann (2018) state that the increasing digitization of our livelihood is changing the medical profession. Various modern digital technologies are now used in medical practice and research, especially at the doctor-patient and doctor-physician level. According to research by Gowda and team of authors (2020), administrative burdens, including documentation and order entry, are the main factors of doctors' burnout, consuming about 50% of doctors' time. Even nurses spend about half of their time fulfilling documentation requirements. Digitization of doctors' work can have other benefits such as: faster and more accurate diagnosis proposed.

In healthcare, digitization is present in a variety of areas, with a focus on cost savings and improving quality of care. Digitization brings new opportunities thanks to increasing access to data, the power of computers and advances in machine learning. Help can be found in disease diagnosis, automated surgery, patient monitoring and scientific research. New technologies are transforming the practice of medicine and expanding the possibilities of medical practice (Sætra, Fosch-Villaronga, 2021). In healthcare, technological innovation includes all products and services aimed at improving medical services, reducing costs, and streamlining procedures to prevent, diagnose, treat, and recover patients (Kulkov, et al., 2023). A study conducted to investigate the satisfaction of doctors and nurses with the level of digitization achieved indicates that the relationship between the level of education of nurses and their satisfaction with the bureaucratic burden and digitization of work is not significant. Although nurses with more education showed bigger satisfaction with digitization, bureaucracy is a significant and mainly unfavorable factor for healthcare workers, as well as for doctors. To improve the situation, administrative procedures need to be improved and digital technologies need to be effectively integrated for real modernization and better patient care in terms of limited resources in healthcare sector. A significant relationship emerged in both cases regarding the job factors satisfaction analysis (bureaucratic burden and digitization of work), for both doctors and nurses. These relationships indicate the same preferences and level of satisfaction with the selected factors. The excessive bureaucratic burden of both nurses and doctors negatively affects their attitudes towards practicing the profession. Rather positive feedback from respondents can be observed with digitization. The biggest problem of Slovak healthcare institutions in the field of modernization is the inability to limit bureaucratization and inadequate administration. Proper implementation and application of digital tools should help to remove this burden.

Conclusions

The conducted study highlighted the significance of digital transformation in healthcare sector, pointing out to the reality of the impact on various aspects of medical practice. These claims are supported by conducted research, the results of which demonstrate that digitization can improve the speed and accuracy of diagnosis, which is a critical factor for providing optimal care to patients. However, despite these positive benefits of digitization, the administrative burden in healthcare remains a significant problem.

The findings of the study for both groups of health professionals surveyed show dissatisfaction with the significant bureaucratic burden. On the contrary, the gradual incorporation of digitization of work is bringing about a modernization effect and faster data availability. Recommendations based on the results of the study are as follows:

1. To reduce administrative elements and increase automation and digitization of tasks to free up doctors' and nurses' time,
2. To increase the integration of digital tools into medical and nursing practice. Digital tools should be designed to make healthcare professionals' jobs easier and to increase efficiency in care,
3. To monitor the level of satisfaction with working conditions, where healthcare facilities would be better able to get feedback from healthcare workers, where their ability to use and operate digital tools should also be increased. The feedback should also contribute to the question of the ability to manage digital tools and other investment opportunities.

Research limitations:

The following limitations have emerged when processing the questionnaire survey data:

Sample of respondents (doctors - 212 and nurses - 752): the survey sample size might affect the representativeness of the results.

Distribution of questionnaires and the period of data collection: the level of openness and honesty of the respondents may affect the results and their timeliness. The questionnaire was distributed from April 2022 to November 2022, the length of the period might affect the relevance and currency of the information obtained. The time period might affect the quantity and quality of information obtained.

To process the results, it is crucial to consider all factors that might shape their relevance when interpreting the results.

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