

## HEALTHCARE INSTITUTION EFFICIENCY: META-ANALYSIS AND CASE STUDY

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**Abstract:** *The article analyses the factors that influence the efficiency of a medical institution. The VOSviewer bibliometric analysis allowed to identify four main clusters that determine the dominant areas of scientific research related to the topic of the medical institution efficiency. The largest cluster was the one describing the relationships between factors that directly determine the healthcare facility efficiency (decision-making, use of information technologies (artificial intelligence, blockchain, Internet of Things, etc.), effectiveness of solving medical problems of patients, etc.) The second largest cluster combines research areas related to the organisation, management, standardisation, audit, professional development, quality and productivity in healthcare facilities. The third and fourth clusters are related to the service and resource components in ensuring the efficiency of a medical institution, respectively. The article presents various approaches to classifying performance indicators of a medical institution: by type of performance, by form, by costs, by measurement of results, by scope of work, by stages. The national approaches to the medical industry development in the UK, Ukraine and Germany are analysed. The mechanisms for decentralising the management of medical institutions, increasing their autonomy, productivity and quality of medical services are described on the example of Ukraine. Using the pattern of a typical medical institution in a small city of Ukraine, the mechanisms for increasing efficiency are analysed: in terms of staffing, patient care, financing, corporate culture, patient-centeredness, and control over financial flows separately for each level of medical care. Priority steps to improve the infrastructure support of the subject of analysis, possible measures to improve the quality of medical services, the preferred resources for financing the planned measures, the implementation period and the expected results of proposed measures are identified. From the theoretical point of view, this article deepens knowledge about the nature of the medical institution efficiency. From a practical point of view, recommendations and ways to improve the medical institution efficiency make it possible to form a roadmap for promising changes. Their implementation will increase the primary healthcare facility efficiency and ensure a vivid rise in the medical provision efficiency at the secondary level in the short and medium term.*

**Keywords:** healthcare facility; efficiency; bibliometric analysis; public health; resources; medical staff; roadmap; patient-centeredness.

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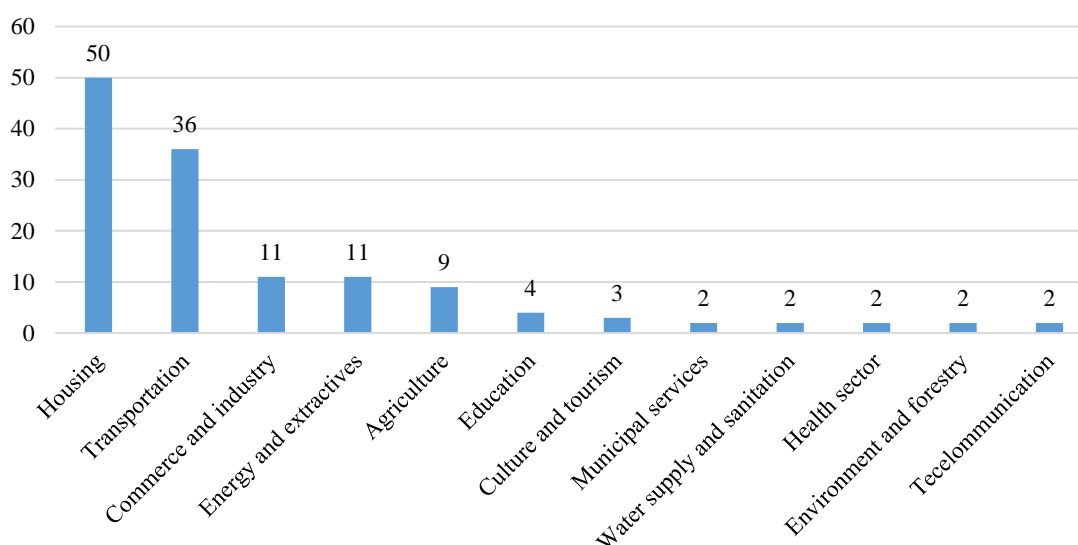
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## INTRODUCTION

The modern development of the healthcare sphere actualises the issue of competition between institutions of different specialisation and subordination. This aspect requires institutions to review their service delivery systems, improve quality, develop and implement innovations. A separate challenge for institutions in the medical field, particularly municipal ones, is problems with limited financial resources and a shortage of medical personnel, necessitating the renewal of management methods and the development of modernised and improved strategies. The medical field in Ukraine has not been in the best condition lately. And despite some positive developments (in particular, in the primary and secondary chain of medical service provision), the service provision quality by medical institutions remains insufficient. However, the increase in population mortality and morbidity, insufficient infrastructural support, shortage of highly qualified specialists, and other problems in medical institutions reduce the national potential of medical and social population welfare.

Trends in the health care market after 2022 indicate that despite the fact that during the COVID-19 pandemic and hostilities, the Ukrainian health care system continued to function at the level adopted to meet the basic medical needs of the population, but at the same time both the crisis of an epidemic nature and the crisis of a political-military nature identified the presence of a number of problems in the health care system and existing and potential risks for the system of medical and social welfare of the population in the country. Demographic changes, migratory movements, financing issues, availability of medical services - all these pose significant threats and challenges to the Ukrainian health care system. As for trends in the volume of medical services, it is expected that in the first months of the war in 2022, their consumption will drop significantly. However, both outpatient and specialised medical care gradually recovered to pre-war levels already by the end of 2022. Downward trends in provision are observed in primary care, which is due to a number of objective and subjective factors (Healthcare at War, 2023). In 2023, health care expenditures amounted to UAH 217.4 billion, of which state budget expenditures together with transfers amounted to UAH 181.8 billion. UAH 139.4 billion was allocated to the implementation of the medical guarantee program (emergency, primary, specialised medical care, as well as reimbursement) (Ministry of Finance, 2024).

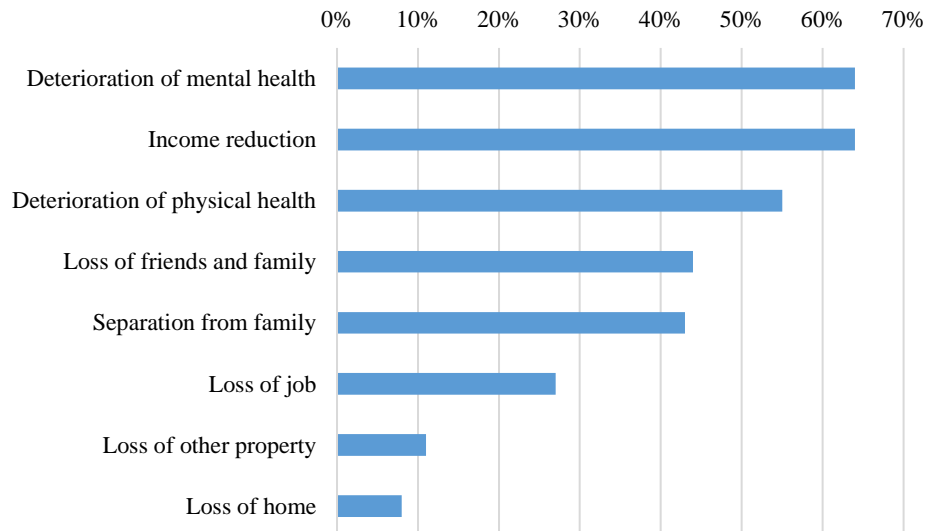
Unfortunately, the healthcare sector of Ukraine remains among those most affected by the terrorist acts of the aggressor country. Yes, just from February 2022 to February 2023, the health care sector suffered damage from the destruction of more than 2 billion U.S. dollars, as evidenced by the data visualisation in Figure 1.



**Figure 1. Monetary measurement of losses by industry in Ukraine in the period 2022-2023**

Source: Generated by the authors using Stata (2024)

Total losses for Ukraine are estimated at 135 billion U.S. dollars and this is as of the beginning of 2023. The situation is exacerbated by losses of 35% of GDP. Negative economic and political-military trends naturally affect the physical and psychological state of the country's population, which, among other extremely negative effects, exacerbate the difficult situation in the health care system (Figure 2). The number of respondents for the survey amounted to more than 2,000 people. The study was carried out by the SATI method. Temporarily occupied territories were excluded from the sample.



**Figure 2. The share of respondents who noted the specified problem in their lives (survey among the population of Ukraine, in which it was possible to choose more than one possible answer), 2023.**

Source: Generated by the authors using Stata (2023)

The medical field continues to play a dominant role in ensuring the vital activities of society. Its infrastructural support, quality of functioning and efficiency of activity are key in the system of providing social guarantees to the population and increasing the level of well-being in the country. This actualises the issue of finding ways and forming a system of implementing measures and tools to increase the effectiveness and productivity of medical institutions of various levels and subordination in Ukraine.

## LITERATURE REVIEW

The effectiveness of various participants in the medical service market has been investigated in many scientific works. Among the scientific works on the given topic, one should single out Changhee & Hyun Jung (2019). They analysed the effectiveness of players in the healthcare market and investigated the relationship between various types of effectiveness, achieving ways to optimise the supply chain of the healthcare sector.

Miura et al. (2022) investigated the effectiveness of over 400 medical institutions in Japan regarding the interaction between patients and medical staff. Benchmarking analysis is widely used to compare various financial indicators of the activity of medical institutions to determine the effectiveness of institution's management system and the level of activity of each department (Nakagawa et al., 2011).

Multi-vector models of research on the effectiveness of medical institution management are discussed by Soares et al. (2017). They provide an opportunity to reveal valuable insights into ways to improve the productivity of medical institutions.

The study of institutions of various specialisations with the search for a general efficiency index was carried out by Caballer-Tarazona et al. (2010) with the help of the Data Envelopment Analysis method and discriminant analysis. The efficiency level of public health facilities according to their types of subordination and the factors affecting it were investigated by Chiu et al. (2022). Here, a combination of comparative and regression analyses was used.

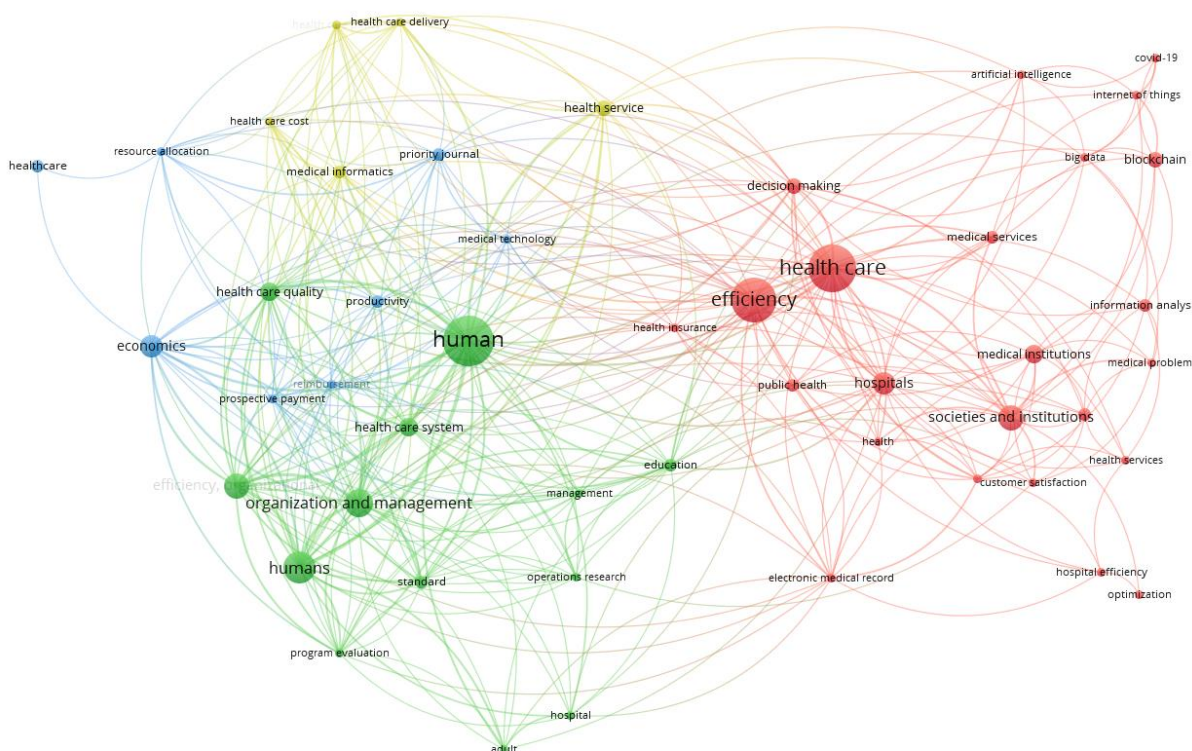
The medical market is the subject of research by Schneider et al. (2020). The authors define the resource use efficiency as the initial condition for high productivity of medical institutions. In particular, they pay special attention to solving issues of urgent medical conditions, including those caused by epidemic threats.

The effectiveness of medical institutions is also considered in scientific works at the macrolevel, in particular by Sheliemina (2023). Changes in the medical system caused by reforms, in particular the effectiveness of medical service provision, are determined by such macroeconomic indicators as the dynamics of population's health, the ability to resist threats of destabilising factors, such as pandemics.

There are some works where the effectiveness of medical institution management is considered from the standpoint of the resulting operating system of providing resources and technical equipment at all levels of (Persona et al., 2008). A separate series of scientific papers in 2020-2023 is dedicated to the effectiveness of national medical systems in countering the COVID-19 impact and achieving resilience in the socio-economic state of countries (Heshmati et al., 2023; Rahmanov et al., 2021; Vasilyeva et al., 2020; Moiseenko et al., 2022).

The issue of improving the medical care effectiveness in specific areas of medical practice was investigated in the work by Liubchak et al. (2021). The role of the information provision factor in improving the efficiency of medical institution activities was studied by Janakiraman et al. (2022).

Technological factors in the activities of medical institutions, in particular, techno-innovations and digital tools for making management decisions, are studied (Basile et al., 2023; Gomes et al., 2023). All studies have their features of use at the macrolevel, as well as at the local level, or the level of individual medical institutions. However, the territorial features and specifics of activity of each institution and its patients, profile, etc., also determine the approach to its management and determination of critical effectiveness indicators. The bibliometric analysis based on the VOSviewer software (2023) made it possible to determine a list of key terminology related to the concept of the medical institution efficiency (Figure 3). The basis for the bibliometric analysis was scientific works from the Scopus scientometric database using keywords such as “medical institution efficiency” as well as the synonymous expression “healthcare institution efficiency” in the time period from 2008 to 2024. That confirmed the earlier statements that the definition of efficiency and the set of indicators that determine it are very diverse in different countries and scientific schools. The identified features allow us to form an approximate list of factors to consider when forming a management control system in healthcare institutions.



**Figure 3. Results of bibliometric analysis of terminology by the search phrase “medical institution efficiency”**

Source: Generated by the authors via VOSviewer (2023)

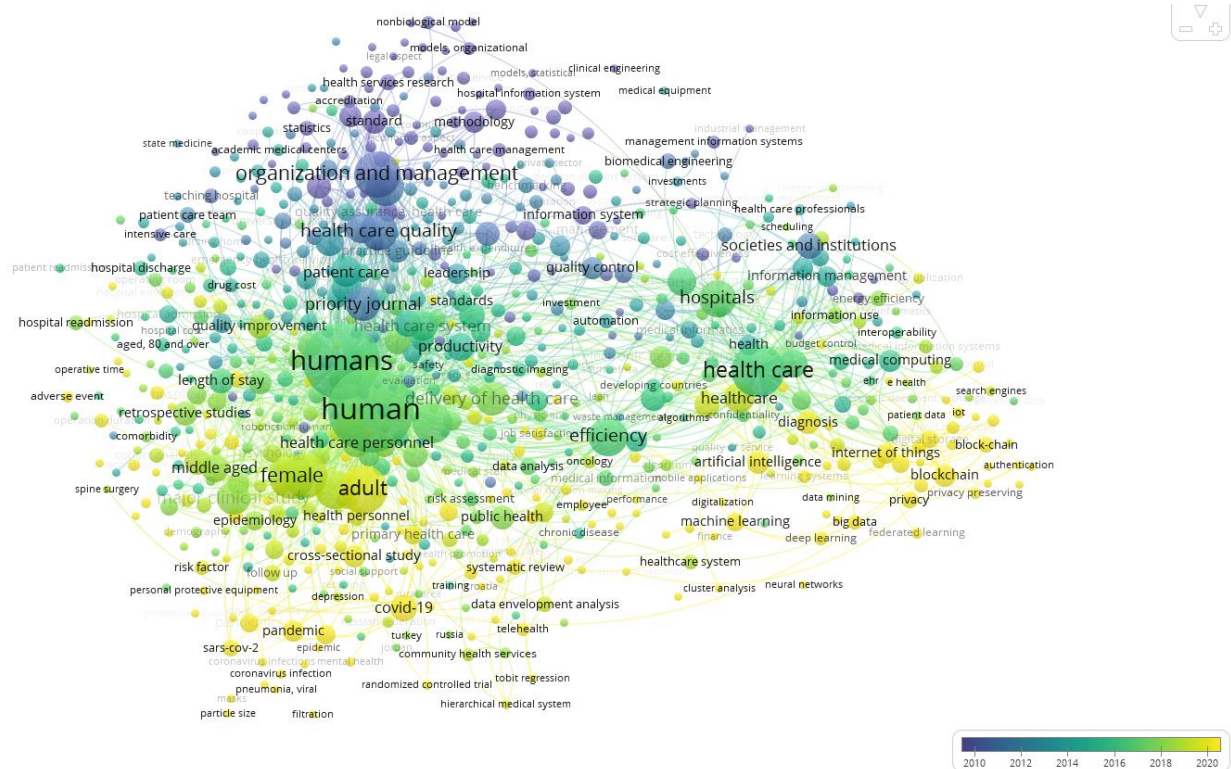
Keywords found in the analysis of medical institution efficiency can be divided into four distinct clusters. The red cluster describes interrelationships between concepts of factors directly determining the medical institution efficiency, such as decision-making, use of information technologies, effectiveness of solving patients’ medical problems, etc. The green cluster describes a human-centred approach to determining the subject activity efficiency in the medical field. The yellow cluster describes characteristics of medical services that can, directly and indirectly, affect the institution’s efficiency. The blue cluster indicates purely economic factors of the medical institution efficiency. Figure 4 shows the co-authorship analysis results of authors’ relationships from different countries.



**Figure 4. Results of bibliometric analysis of scientific schools in the medical efficiency study**

Source: Generated by the authors via VOSviewer (2023)

The maximum number of works on the research topic belongs to authors from the USA, China, and the United Kingdom. It is these countries that form three clusters of geographical research regions. Gul & Karadayi-Ustra (2024) investigated the resource component of the efficiency of healthcare institutions, focusing in particular on the supply of medical personnel and bed stock, taking into account the seasonality factor of the demand for medical services. Research that determines the energy efficiency of medical institutions deserves special attention.



**Figure 5. Results of bibliometric analysis of scientific schools in the medical efficiency study**

Source: Generated by the authors via VOSviewer (2023)

Evolutionary analysis of categories in efficiency of healthcare institutions shows that until 2014, research on management of healthcare organizations was mostly popular. However, since 2016, in scientific research on the provision of human needs, a human-centric approach to medical services, prevails. After 2020, research on countering the coronavirus pandemic and improving the productivity of activities in conditions of limited resources in healthcare gained significant popularity.

Alotaiby & Krenyacz (2023) define the medical field as one of the most energy-consuming sectors of the national economy and explore a wide range of energy-saving technologies that can increase the efficiency and economy of these institutions using the example of Middle Eastern institutions.

Malhan et al. (2023) investigate the effectiveness of medical institutions from the point of view of their information provision, which is capable of levelling gaps in the management of a medical institution. The article is focused on the study of EHR systems of operational measures within the framework of the work of organisations of a medical profile. The authors emphasise that these systems are able to regulate the cost components of the institution's activities.

Part of the research is devoted to the indirect factors of the productivity of the medical institution. In particular, Wang et al. (2024) investigate how the use of social media is able to influence the effectiveness of the work of medical personnel and their psychological endurance, the quality of the performance of work tasks. That is decisive in forming the general opinion of patients about the provided medical services.

Wulandari et al. (2024) devoted their study to the study of the degree of patient satisfaction with the provision of services by medical institutions. From these positions, the effectiveness of the organisations of the health care system in performing their functions and their productivity is determined. They examine such performance indicators as physical environment, customer-oriented atmosphere, responsiveness, effective communication, privacy maintenance, and safety.

Zhang & Yang (2023) investigated the efficiency of medical facilities at different regional levels over a period of 15 years using DEA analysis. The analysis includes such indicators as state subsidies, marketing to determine their impact on the activities of regional medical institutions.

Ong et al. (2023) set the goal of their research to analyse lean healthcare effectiveness and the factors determining this effectiveness. To do this, they analysed more than 200 responses of specialists in the field of health care. The conducted analysis made it possible to determine the key efficiency factors, which were corporate culture and personnel qualifications.

Piedra-Pena & Prior (2023) investigated whether state reforms had an effect on the performance of medical facilities in the analysed country. The novelty of their research and unconditional contribution is an attempt to analyse the relationship between the reform aimed at the universal coverage of medical services, the inclusiveness of social services and the efficiency of the health care system.

Alharbi & Kundi (2023) investigated aspects of leadership in a medical profile institution and the impact of the effectiveness of this component of the institution on the quality of providing medical services, the quality of treatment and, in general, the formation of medical culture in society.

## METHODOLOGY

The article uses the benchmarking analysis of improving the medical institution efficiency in foreign countries. Besides, it applies other methods and approaches to examine performance of medical institutions. As a research object, we chose a typical state hospital in Sumy Oblast. Also, the comparative analysis of efficiency of medical institution units is applied. The study hypothesis assumes that institution efficiency in medical service provision can increase via consideration of various aspects: personnel policy, service policy, and financing of activities. The study of healthcare indicators was carried out based on an analysis of the internal documentation of business entities.

The research comprised the following steps:

- substantiation of the theoretical and methodological principles of ensuring the effectiveness of the management of a medical institution;
- analysis of the effectiveness of the management of a medical institution on the example of a typical regional health care institution of the Konotop Central District Hospital;
- development of suggestions on ways to improve the effectiveness of activity management of the Konotop Central District Hospital.

In the article, as an information base, the research uses primary sources of information on performance of the analysed object of the medical industry. It comprises internal reporting, accounting, and secondary sources on medical development trends and the experience of measures to improve the efficiency of other healthcare institutions in Ukraine.

The research determines the trends, as well as successful and unsuccessful strategies and tools, which are already used in the practice of the analysed medical object and other typical institutions of the region. Based on the analysis results, it became possible to develop a road map for decision-making and implementation of measures to optimise management implementations in the health care institution. To control and verify the effectiveness of various performance management tools, it is suggested to use a mix of qualitative and quantitative methods. The results correlate with those obtained in previous studies of a similar nature, and appropriate conclusions are drawn based on such a comparison. An important component of the monitoring and methodology proposed by the authors is receiving feedback from hospital patients. This methodology allows to determine the effectiveness of applying each specific tool and evaluate the impact of the tools on attracting new patients and managing their diseases. The proposed set of road map tools makes it possible to understand the needs and preferences of patients, medical personnel and the urgent need to implement certain measures.

## RESULTS

In Ukraine, due to the reforms, many changes took place. In particular, out-patient polyclinic care institutions (primary care) were rearranged as separate structures. A highly specialised care link (secondary and tertiary links) is now functioning separately. Family doctors have become leading performers and providers of primary medical care. These doctors serve patients with chronic diseases, diagnose and treat diseases that do not require highly specialised care, conduct preventive work, monitor immunisation issues, perform simple surgical operations, prescribe referrals for further treatment in in-patient departments, etc. Since the number of declarations concluded with one family doctor is limited, he has an opportunity to assess the social and physiological condition of patients more deeply due to the relief of workload. A more trusting relationship between the patient and the doctor is formed, costs for additional examinations are reduced. As a result, the economic efficiency of medical institutions increases. Improving doctors' qualifications is facilitated by the need to obtain points as a part of evaluations of specialised testing centres (Continuous Professional Development). Thanks to receiving points, doctors not only pass the planned certification, but it also motivates them to further self-improvement. In addition, introducing such an approach as continuous professional development stimulates development of medical education institutions. Free choice of disciplines and study formats form the demand for educational services. However, high price of education in public institutions encourages doctors to use offers of pharmaceutical company representatives. It provides an opportunity to take free courses with points while simultaneously advertising their products. During the calendar year, the doctor must score at least 50 points. There are different formats of activities for which you can get points, from attending a free online lecture to a costly internship at a specific clinic.

To ensure a high efficiency level in medical institution activities, in particular municipal non-commercial enterprises, some tasks have been defined in Ukraine. They provide for implementation of structural changes in the national health care field that national and local authorities must carry out. Considering the performed literature review and analysis of the medical care market, it can be concluded that the quality provision of medical services by the medical municipal non-commercial enterprises is achieved due to implementation of an effective personnel policy and a financial support policy of the institution.

By the medical institution efficiency, the authors understand its ability to accumulate resources effectively, which has a positive effect and is significant for the final result of institution's activity. This effect can be economic or social (medical) in nature. Specific performance indicators can characterise any medical facility (Table 1).

One of the main criteria used to analyse the healthcare institution efficiency is medical. This indicator is characterised by the qualitative and quantitative achievement of goals for improving the disease prevention, treatment or diagnosis. Health indices (performance indicators of a particular medical institution) include morbidity rates, death rates, surgery activity analysis, and primary morbidity rates. The introduction and use of new techniques and tools is an example of increasing medical efficiency, because it reduces the patient's stay period in the hospital, optimises duration of staff working hours, and improves service quality. Thanks to the development of medical care and the implementation of reforms in the medical sector in Ukraine, mortality rates are decreasing not only among adult population but also among infants (due to the management of pregnancy by family doctors, timely detection, and prevention of pathologies). Communal medical institutions modernise and enlarge equipment for receiving packages from the National Health Service, which makes it possible to increase the institution funding. In recent years, the number of nosologies for which medical care can be obtained in primary care institutions without hospitalisation has been increasing. Medical services are becoming more inclusive. To analyse management effectiveness for an individual patient, a different set of indicators is used, such as the patient's condition (deterioration, improvement, or no change) (Stefanyshyn, 2019).

**Table 1. Efficiency indicators of medical institutions**

<b>Classification</b>	<b>Index types</b>
By type of efficiency	Medical, social, economic
By form	Normative indicators of population health, cost indicators, indicators of labour costs
By expenses	Efficiency of public labour costs, efficiency as a total indicator based on taking into account the costs of living and public labour
By result measuring	Efficiency due to the reduction of resource losses, efficiency due to saving resources, efficiency due to an additional result, integral efficiency
By work volume	Efficiency of medical and preventive measures; efficiency implementing medical and social programs
By stages	Disease prevention, disease treatment, rehabilitation

Source: Systematised by the authors based on Medianyky & Lypchanskyi (2016)

Economic efficiency for a medical institution is expressed in the ratio of the economic effect achieved due to implementation of specific treatment and preventive measures and the costs used to implement these measures. At the same time, the direct economic effect is distinguished by improving the methodology or creating specific measures that cause the cheaper provision of services. Thus, for example, the number of bed-days in the department is saved due to the introduction of new forms of work organisation for medical workers (one-day hospital, nursing department, day hospital, home hospital). The use of cheap but effective methods of diagnosis and treatment ensured a reduction in the patient treatment cost. There are medical and social effects. Their effect over time impacts on the treatment quality improvement, reducing the costs of fighting diseases. There is also an economic effect due to reduced losses because of mortality and disability. A peculiarity of the medical field is that it is almost impossible to trace a clear relationship between the amount of labour doctors spent per patient and final result. Thus, spending more money and time on a retired person with the same nosology is necessary than on a young person of working age.

The medical reform taking place in Ukraine has many aspects borrowed from the UK health care system in terms of autonomy of medical institutions, medical service and budget hospital provision. The UK population is approximately 60 million people. Spending on health care reaches 7% of the country's GDP. The NHS is a public body in the UK funded by the tax-paying working-age population. This service was established in 1948. For each patient, the family doctor receives a fixed amount of money. Certain factors can affect the amount of money a doctor receives for a patient:

- Patient Age (payment for managing elderly patients is higher, because the older the patient, the greater the number of chronic and concomitant diseases he has);
- The specificity of provided services (for surgical referral services or for those that require specific equipment, payment is much higher);
- Quality indicators (for example, the immunisation level – additional payments are provided for implementing the plan).

In the country, the level of competition between healthcare institutions is increasing. The latter raises the quality of medical services. If the patient buys medicine with a doctor's prescription, he pays 24% of the cost; without a prescription, he pays 100%. Primary healthcare accounts for most funding in the UK healthcare system, so its work maintains high-quality indicators. As a result, the secondary sector is underfunded. Patients can be in the queue for hospitalisation and consultation with a narrow specialist for several months. The above contributes to developing the private hospital market. For patients, they become a salvation from long queues.

In Germany, the share of GDP allocated to health care financing is about 10%, and the population is about 80 million people. Since 1883, the health care system here has hardly changed. Bismarck proposed its main principles. The main principle of healthcare is a mandatory social insurance, autonomy, and medical facility decentralisation. About 80% of population is insured. There is social insurance for the unemployed at the expense of the state. Employers provide health insurance for employees and their family members. Healthcare institutions (providers of medical services) and purchasers of medical services (hospital funds) are separated. However, there are also shortcomings in the German medical system, namely the lack of medical personnel.

We will analyse efficiency of managing a municipal non-commercial enterprise using the example of the M. Davydov Konotop Central District Hospital. The hospital provides primary, specialised medical care to all population categories. In 2019, the institution passed accreditation, which confirmed that it provides high-quality medical care (first accreditation category). This institution is recognised as a cluster institution, which serves virtually the entire population of the Konotop region (more than 190,000 people). The list of medical services provided by the analysed medical institution is given in Table 2.

**Table 2. Services of the M. Davydov Konotop Central District Hospital**

<b>Group of in-patient medical services</b>	<b>If such a service is not provided at this facility, where are patients referred to receive it</b>	<b>Number of beds as of 01.01.2024</b>
General surgery		48
Neurosurgery	Sumy Regional Clinical Hospital, Department of Neurosurgery	–
Cardiac surgery		–
Thoracic surgery	Sumy Regional Clinical Hospital, Thoracic Department	–
Vascular surgery	Sumy Regional Clinical Hospital, Department of Vascular Surgery	–



**Table 2 (cont.). Services of the M. Davydov Konotop Central District Hospital**

<b>Group of in-patient medical services</b>	<b>If such a service is not provided at this facility, where are patients referred to receive it</b>	<b>Number of beds as of 01.01.2024</b>
Combustiology	Sumy Regional Clinical Hospital, Surgery Department	–
Maxillofacial surgery	Sumy Regional Clinical Hospital, Dental Department	–
Traumatology and orthopedics		25
Intensive therapy		6
Obstetrics		30
Gynecology		20
Neonatology	Sumy Regional Perinatal Centre	–
Pediatrics		40
Children's surgery		2
Cardiology, including reperfusion centre		37
Neurology, including stroke centre		35
Hematology	Sumy Regional Clinical Hospital, Hematology Department	–
Pulmonology	Sumy Regional Clinical Hospital, Pulmonology Department	–
Endocrinology	Sumy Regional Clinical Hospital, Endocrinology Department	–
Gastroenterology	Sumy Regional Clinical Hospital, Gastroenterology Department	–
Nephrology	Sumy Regional Clinical Hospital, Nephrology Department	–
Rheumatology	Sumy Regional Clinical Hospital, Rheumatology Department	–
Allergology	Sumy Regional Clinical Hospital, Allergology Department	–
Immunology	Sumy Regional Clinical Hospital, Immunology Department	–
Therapy		47
Otolaryngology		10
Ophthalmology		10
Infectious diseases		25
Dermatology		5
Oncology		5
Tuberculosis department	Sumy Regional Clinical Tuberculosis Dispensary	–
Rehabilitation		20
Psychiatry	Municipal non-commercial enterprise of the Sumy Regional Council "Specialised Hlukhiv Hospital" Municipal non-commercial enterprise of the Sumy Regional Council "Specialised Romny Hospital"	–
Palliative care		20
Nursing care		–
Transplantology		–
Urology		15
Narcology		15
Proctology		5

Source: Summarised by the authors based on the internal documentation

An important place belongs to the analysis of the hospital staff potential, which is an essential prerequisite for ensuring timely and qualified medical care. Every year, the staff list is brought into line with the population's current needs in medical care (Table 3). Qualification categories of the institution staff are represented in Table 4.

Staff is replaced at the expense of graduates of higher education institutions (doctors). The institution replenishment with secondary medical personnel takes place at the expense of graduates of the Konotop Medical College (Table 5).

**Table 3. The total staff of the medical institution (persons)**

<b>Group</b>	<b>Quantity</b>	<b>Pensioners of them</b>
Doctors	169	51
Medical nurses	469	20
Junior medical staff	201	30
Other staff	151	50
<b>Total</b>	<b>990</b>	<b>151</b>

Source: Summarised by the authors based on the internal documentation

**Table 4. Qualification characteristics of employees of the analysed medical institution (persons)**

<b>Group</b>	<b>High</b>	<b>1st</b>	<b>2nd</b>	<b>Specialist doctor</b>
Doctors	83	31	12	31
Medical nurses	254	82	57	–

Source: Summarised by the authors based on internal documentation

**Table 5. Employment of young specialists in the Konotop Central District Hospital, persons**

<b>Group</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Doctors	8	6	7
Medical nurses	7	10	4

Source: Summarised by the authors based on internal documentation

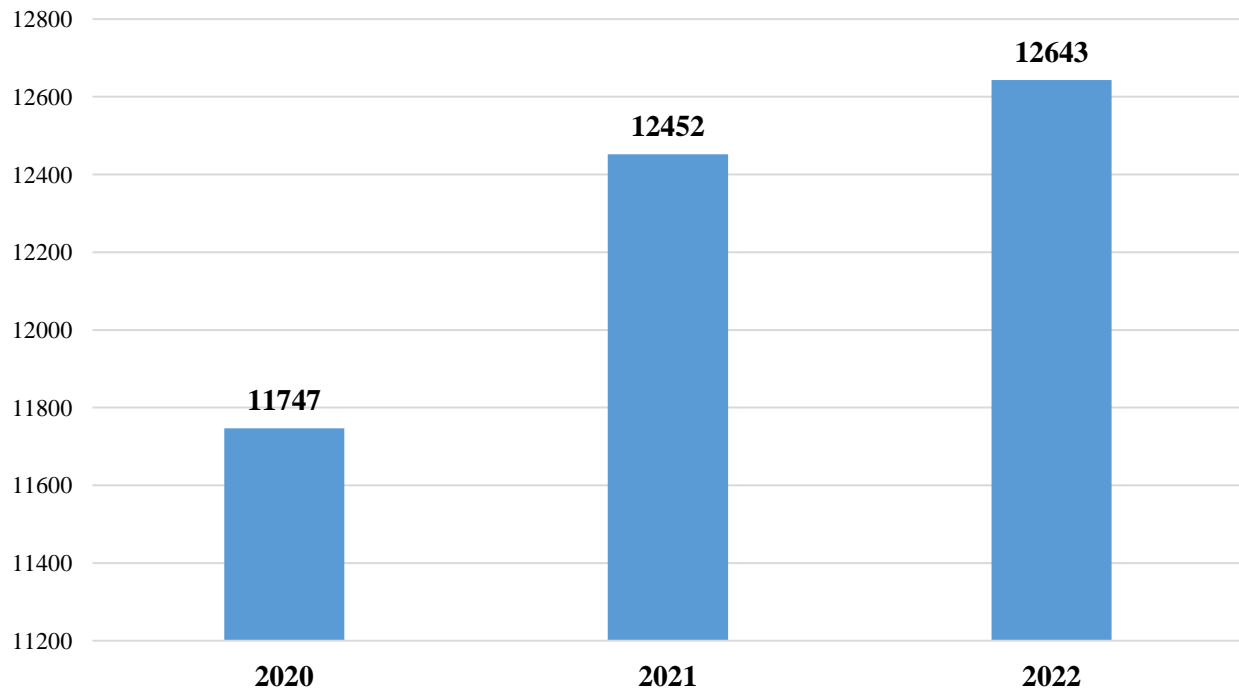
According to the Program of Medical Guarantees in 2022, medical assistance was provided in 26 packages. Among them, priority areas in the reporting year were medical assistance for acute cerebral stroke in hospital conditions and medical assistance during childbirth. In 2024, the institution plans to add five additional packages. Vaccination of the population against COVID-19 was carried out in primary medical care clinics, if there were four vaccination points.

The hospital has the department of rehabilitation medicine and physiotherapy. From 2021, the hospital will provide services based on out-patient rehabilitation packages: medical rehabilitation of babies born prematurely or sick; rehabilitation of adults and children from three years of age with damage to the nervous system; rehabilitation of adults and children from three years of age with damage to the musculoskeletal system.

The total institution financing volume in 2022 was about 280,000 UAH. Of those funds, from the National Health Service – 250,000 UAH, funds from the city budget – 20,000 UAH, and income from the provision of paid services – over 7,000 UAH. The most considerable specific weight in the institution’s cost structure is wages with accruals (about 210,000 UAH), utilities (about 16,000 UAH), medicines and dressing materials (about 35,000 UAH), and food (about 3,000 UAH).

A detailed analysis of the institution made it possible to highlight its strengths and weaknesses. Strengths include free medical care; proximity of structural units of primary medical care to patients; qualified staff; providing medical workers with medical transport; providing medical services outside the medical guarantee program; 100% coverage of the Internet network and 100% provision of family doctors with computer equipment; implementation of the Medical Information System and the Automated Workplace programs; quality of the material and technical base; available institution website; high level of energy efficiency of hospital premises. Weaknesses include more than 60% of family doctors of retirement and pre-retirement age; no financial system for staff motivation; competition with private healthcare institutions.

More than 13,000 patients receive in-patient treatment at the institution every year. Up to 4,000 surgical interventions are performed in in-patient surgical departments per year. About 500 babies are born in the maternity ward. 115 beds have been allocated for the COVID-19 treatment. A total of 859 patients with the CODIV-19 diagnosis were treated in 2022 (2021 – 1,544). 78 of them died (2021 – 217), the mortality rate was 9.1% (2021 – 14.1%). The dynamics of the number of hospitalised persons is shown in Figure 6.



**Figure 6. The number of hospitalisations in the medical institution**

Source: Generated by the authors based on internal documentation

Responding to the new challenges of martial law, taking into account the new directions that will become priorities (rehabilitation care, palliative care in inpatient conditions), it is necessary to open the department of inpatient palliative care based on the oncology and rehabilitation departments. In 2024, the department of advanced laboratory diagnostics is planned to improve the diagnostic process quality and shorten the time for diagnosing itself. The opening is possible if the latest diagnostic equipment is purchased. In 2025, the hospital plans to open the reperfusion department to treat heart diseases if an angiograph is purchased. In addition, it is planned to equip the hospital with an additional X-ray diagnostic system, a video colonoscope, a video fibrogastroscope. Capital repairs are planned. The road map for increasing the institution efficiency is represented in Table 6.

**Table 6. The road map for increasing the medical institution efficiency**

№	Priorities (main activities)	Index	Implementation period (years)	Expected costs (UAH)	Source of funding
<b>Strategic goal:</b> increasing efficiency of the primary medical care system					
<b>Operational goal:</b> a capable network of the primary medical care centres					
1	To conduct an analysis for each doctor regarding the number of residents and the number of those who signed a declaration with a family doctor	The number (percentage) of residents with whom service declarations have been concluded	Quarterly	No additional financing is required	–
2	To conduct a financial analysis of the expenditures and revenues of the CNP for the provision of primary medical care	Balance report on the provision of primary medical care	Quarterly	No additional financing is required	–

**Table 6 (cont.). The road map for increasing the medical institution efficiency**

<b>№</b>	<b>Priorities (main activities)</b>	<b>Index</b>	<b>Implementation period (years)</b>	<b>Expected costs (UAH)</b>	<b>Source of funding</b>
3	To optimise staff structure. The personal participation and functional load of employees is determined	Updated collective agreement, staff schedule, and job instructions	2024	No additional financing is required	–
4	To define fair wage system	Increased salary level	2024-2025	No additional financing is required	–
5	To establish communication with medical universities of the region, Ukraine to attract graduates	Number of employed university graduates	2024-2025	No additional financing is required	–
6	To create a training schedule for medical personnel for professional development	The training schedule of	2024-2025	No additional financing is required	–
<b>Strategic goal: increasing efficiency of the secondary-link medical care</b>					
1	To analyse diseases with which patients are referred to secondary care by family doctors	Updated statistics on the nature of patients' illnesses. The number of referrals to the secondary care of patients with a distribution according to different nosologies	2024-2025	No additional financing is required	–
2	To expand the spectrum of minimally invasive surgical interventions in gynecological and surgical departments	The number of performed minimally invasive operations by departments	2024-2025	1,000 UAH	Budget of the hospital, territorial community
3	To establish cooperation with tertiary level institutions for endovascular interventions in diseases of brain and heart vessels	Number of patients discharged with recovery	2024-2025	500 UAH	Budget of the hospital
4	To open the in-patient rehabilitation department	Number of patients discharged with improvement	2024	2,000 UAH	Budget of the hospital
5	To open the in-patient palliative care department	Number of treated patients	2024	2,000 UAH	Budget of the hospital
6	To open the reperfusion department for treating heart diseases	Improving the patient's treatment quality	2025	50,000 UAH	International support projects, local community and hospital funds
<b>Total expected cost: 105,500 UAH</b>					

Source: Authors' development

## DISCUSSION

The approach to the interpretation of efficiency in this article is interpreted as the institution's ability to mobilise its financial and human resources in order to achieve better performance indicators, which is somewhat different from the understanding of this concept and ways of achieving it in other scientific works. In particular, unlike this study, Fonseca et al. (2022) analyse the impact of effective knowledge management, organisational intelligence on the ability of hospitals to respond to outbreaks of COVID-19. The authors put forward a number of hypotheses, which were tested using a questionnaire of medical personnel and using the PLS-SEM technique. The study confirmed the hypothesis that effective management of organisational knowledge and work productivity in the medical field is an important element of countering the pandemic. Scientists offer their model for managing the response of health care institutions to the COVID-19 pandemic. Hampel (2021) identified directions for improving the performance of national health care institutions with a proposal for future changes after identifying the strengths and weaknesses of the work of medical clinics based on the analysis of the opinions of their patients. Considerable attention in the writings of recent years is paid to the issue of the implementation of Industry 4.0 approaches in the medical care system of the countries of the world. Tortorella et al. (2021) offer their own problem-oriented methodology for using algebraic operations to prioritise the integration of Industry 4.0 technologies in medical institutions. The proposed method is aimed at assessing the maturity of the medical institution in this area and the opportunities for improvement in this area. Digitisation of health care organisations is indicated as an element of increasing its potential to ensure a state of resilience in the face of pandemic challenges or other upheavals in the medical field. Chen et al. (2020) emphasise that over the past two decades, the computerised health information system has become a very important element of management in the medical field. It is natural that medical institutions pay more attention to replacing traditional approaches in management with those that allow processing larger volumes of data about patients, treatment, diseases, etc. This study is aimed at evaluating organisational barriers in the implementation of a health care information system based on big data. The model proposed by the authors can provide hospital managers with information about predictions and consequences that will help to eliminate such barriers when implementing a health care information system based on big data into national health care delivery systems. As a result, such an approach can provide advantages for the medical institution in terms of the productivity of its work, formulate effective strategies for solving problems according to priorities.

Adinolfi & Borgonovi (2018) opened the issue of the principles of modern management in the field of health care with examples of practical strategies. Those management methods that negatively affect the quality of medical services are analysed. It describes in detail how it is possible to change the approach to strategic management in this area due to changes in organisation, scale and management style. A number of works emphasise that the health care system is the field where it is appropriate to use the concept of marketing to improve management efficiency. Esposito (2017) investigated the features of the communication strategy and corporate brand building of the national system of healthy development. A significant part of scientific works is devoted to the development of key performance indicators of models that determine the effectiveness of the work of health care institutions, in particular, in (Kotenko et al. (2021), this model is based on identifiers of the motivation of medical staff and the competitiveness of the health care institution. The need to build an effective and resilient to the challenges of the external environment, the public health system of Ukraine today actualises the issue of developing a comprehensive plan of actions and measures that can be combined within the framework of a comprehensive road map for the introduction of healthy development of the national economy. At the legislative level, the concept of public health as a category which describes the country's position in combating diseases, strengthening health, and increasing the healthy life expectancy of the population. In matters of public health management, the powers of the Cabinet of Ministers of Ukraine, the Ministry of Health and other central state authorities, as well as local self-government bodies. It is planned to form a public health information fund as a state marketing and information resource, which contains data on the state of health of the population and indicators of the living environment. It is important to develop a culture of avoiding diseases of various nature and to cultivate disease prevention with a reorientation to the preventive sphere of the health care system, which allows detecting diseases in the early stages and avoiding more serious consequences of diseases for the human body at later stages in case of non-detection in time.

## CONCLUSIONS

Hospital staff should be more responsible for identifying and preventing problems that reduce the quality of medical services or contradict the principles of medical efficiency. To solve the issue of improving and optimising the institution's work, we suggest reviewing the basic principles of auditing and collecting feedback from patients. As a part of the road map for increasing the efficiency of the Konotop Central District Hospital, the purchase of an angiograph, the doctors' training in narrow specialties, the reperfusion department opening for treating heart diseases, and the surgery motivation improvement to expand the medical services are foreseen. One of the main aspects on which we propose to carry out work is the financial analysis of expenses and income of a medical institution to provide primary medical care. We propose to conduct a survey of patients to analyse the efficiency

of the company's service provision. That will make it possible to identify weak points in the hospital work to improve and create a set of actions aimed at eliminating the problems and weak points of the hospital. The proposed methods and proposals will be implemented according to the developed plan described in the road map.

Among the measures to overcome the gaps in the medical system, the following can be distinguished:

- introduction of a mechanism for the rational use of financial resources of the health care system;
- development of a flexible quality management system for the provision of medical services, taking into account the best international experience;
- ensuring proportional participation of public representatives in determining measures to reform the medical system;
- introducing changes regarding the forms and methods of motivating medical personnel;
- development of a system for monitoring public opinion regarding the effectiveness of processes of reforming the system of healthy development of the national economy.

Studies show that the population in Ukraine is ready for digital transformations in order to receive medical services. It is worth noting that the "eHealth" system unites various areas of health care - medical practice, management of medical institutions, medical law, pharmaceuticals and information services for patients. This one-of-a-kind complex system includes a central database and a number of electronic medical information systems. The benefits of this system include simplifying the work for medical staff and virtually automating their routine work and the tasks they face. The doctor has more time to diagnose and treat patients. This service is also convenient for the patient, as he can remotely find the information he needs about the work schedule of the medical staff, the hospital, see reviews about the quality of treatment. At the same time, it is necessary to take into account the shortcomings of the electronic health care system, since its functioning depends to a large extent on the quality of the Internet connection, the operation of the equipment, and the system load. The problem can also be the lack of skills to work with the system both on the part of the staff of medical institutions and on the part of ordinary users. Among the priority areas of healthy development identified by the Ministry of Health of Ukraine: further development of the digital sphere of medical services, ensuring the availability and quality of pharmaceutical products, promoting a healthy lifestyle, protecting the population from infectious diseases (post-traumatic recovery) and countering the spread of other socially dangerous diseases.

Based on the analysis of the current legal framework for the development of the medical field and the reforms of the medical field, a road map for ensuring the effectiveness of the medical institution was developed, which takes into account the complex of strategic and operational goals, indicators, steps to achieve them, the time period and the necessary resources that must be attracted.

### Author Contributions

Conceptualisation, O.D., N.D., N.L.; data curation, O.D., K.T., S.S., M.S.; formal analysis, N.D., N.L., K.T.; investigation, O.D., S.S., N.L., M.S.; methodology, O.D., N.L., N.D.; project administration, S.S.; validation, K.T., S.S.; visualisation, N.L., N.D., M.S.; writing – original draft, K.T., N.D., N.L.; writing – review and editing, S.S., M.S.

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