ARCHITECTURE CIVIL ENGINEERING ENVIRONMENT
The Silesian University of Technology No. 3/2021

doi: 10.21307/ACEE-2021-018

FORECASTING THE TERRITORIAL-SPATIAL DEVELOPMENT OF THE SYSTEM OF CHILDREN'S MEDICAL COMPLEXES IN UKRAINE

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Received: 4.05.2021; Revised: 14.06.2021; Accepted: 7.09.2021

Abstract
The forecast development prediction in time-space of the urban system of pediatric treatment facilities of Ukraine is given at the national-territorial level, based on three complementary information sources for the future: the author's structure of the urban system of healthcare, its components, and promising types of medical institutions; retrospective analysis and patterns of organization and development of the urban system of medical institutions in the leading countries of the world, which indicate the general direction of extrapolation of systems; projected population of Ukraine (optimistic, optimal and pessimistic options), which are obtained through many years of statistical research. The paper presents the results of modeling, which demonstrate the forecast scenarios for the system development of pediatric treatment facilities at the national level of the urban network of primary care facilities and hospital networks. The model's scenarios contain time prospects of the forecast for 2030, 2040, 2050, 2060, and 2100. The probable nonlinear deviations characteristic of the space-time development of the open system and many internal and external probable points of system bifurcations are considered. The research should be challenging and effective for international scientists who study the range of issues of the urban and spatial development of urban systems, their forecast models, and deployment scenarios. The study is also valuable for countries that face the problems of stable depopulation, have an ineffective and cumbersome healthcare system, and are in the process of looking for ways to reform the medical system in an urban planning context.

Keywords: **Urban planning system of healthcare institutions; Hospital; Children's medical institutions; Hospital network; Development forecast.**

1. INTRODUCTION

A key issue of the current stage of development of urban theory in Ukraine is the need for effective and reliable forecasting of the dynamics of development urban systems, including the system of healthcare facilities [1, 2]. This is due to several factors, including lack of a clear development plan at the state level, complication and fragmentation of legal, property, socio-economic, demographic, and other relations and processes, increase in the number of private entities, uncertainty about the actual medical capacity institutions (inflated data on the use of hospitals beds, the duration of treatment of patients). As a result, today it is impossible to collect reliable, comprehensive information about the real situation and possible further development of the urban system of healthcare facilities, in particular its component the system of children's (pediatric) medical institutions and facilities.

Urban planning was developed as a system of planned development in the Soviet period of Ukraine; cities were regarded as functional units of industry and public service centers. The planned prospects of urban planning of the territory for a certain period were

compiled, adjusted, and monitored with the help of a feasibility study of the master plan at the state level. Over time, it turned out that, despite a careful project design approach, the actual city development did not correspond to far-seeing plans and mathematical calculations of city master plans. These phenomena have especially manifested themselves in recent decades when instead of exclusively state planning and control, market interests and relations began to be actively involved, and the development of strategies for the socio-economic development of urban territories became popular [3].

At the beginning of the XXI century, as a result of political and socio-economic changes in Ukraine, the practice of private and non-state forms of buildings ownership, the introduction of long-term land lease, gradually began to change the paradigm of urban planning. The reaction was the emergence of the concept of zoning in urban planning; there was a need to take into account private property and investment, which began to affect the stratification of social values of communities and individual groups of urban residents. Thus, the current stage of development of urban planning as a system takes place against the background of the crisis of post-industrial society, progressive globalization, and urbanization [4–6]. Several studies [7–14] have become the fundamental theoretical basis of the current stage of urban development in Ukraine. The complexity of designing urban systems, including the system of healthcare facilities, in the long post-industrial period of civilization has necessitated the involvement of synergetic approaches and principles of design and forecasting in urban planning [15].

Synergetic, as a new interdisciplinary field of research, in a broad sense studies system capable of self-management, explaining this property as follows:

- the system must be open; in the closed state any system gains maximum entropy and stops evolution;
- the state is close to equilibrium, without significant external influence, over time brings the system into full equilibrium and it stops changing its state;
- self-management is the emergence of a new order of the system due to fluctuations (random unpredictable deviations) of the states of the constituent elements and subsystems;
- self-management occurs in the case of bifurcation (the advantages of a positive feedback operating in an open system over negative feedback;
- complex systems' self-management with the transition from one structure to another, associated with the emergence of new levels of organization and violation of symmetry.

From this position, the urban system of pediatric treatment facilities in its structure refers to the open, with the possible emergence of nonlinear effects due to the nonlinearity of the development of networks and individual institutions-components; bifurcation points where the development scenario of the whole system is correlated; phenomena and signs of self-management. These circumstances necessitate an interdisciplinary research approach to the study of the dynamic development of the urban organization of the system of pediatric treatment facilities to establish certain patterns, development of methods for forecasting of the system development, to provide timely information support in the initial stages, increase the efficiency of the system in general (Fig. 1).

The problem of forecasting the dynamics of urban development of pediatric treatment facilities is interdisciplinary in connection with the complexity and versatility of the object of study, many variable high-powered ratios and factors (external demographic, social, economic, legal, property, infrastructure, migration, political, etc.; internal dynamics and nature of population morbidity, development of medical methods and technologies, etc.) that are directly related to issues and ways of further development, stagnation and system modernization. In this sense, evolution is an essential component of the new urban paradigm, which synthesizes the idea of the laws of evolution of the urban organism and its constituent elements. In the doctoral dissertation Harmony of evolutionary dynamics of self-organization of urban systems, V. Timokhin [15, 16] speaks about the dynamism of urban development, expanding the scale and complexity of spatial connections of the modern urban environment, offers a conceptual vision of potentials and reserves of organization and harmonious development of the urban environment.

In recent decades, Ukraine has seen the growth and consolidation of urban areas in the process of urbanization; increasing the role and the number of lands and underground transport, leading to the needs for the reconstruction of road infrastructure, street network, transport interchanges, and junctions; there is a need to update the urban environment in connection with the spread of new housing modifications high-rise apartment complexes with minimal housing, new requirements and needs of society, comfort criteria, construction, and sanitary standards, new artistic and aesthetic preferences of citizens [17–19].

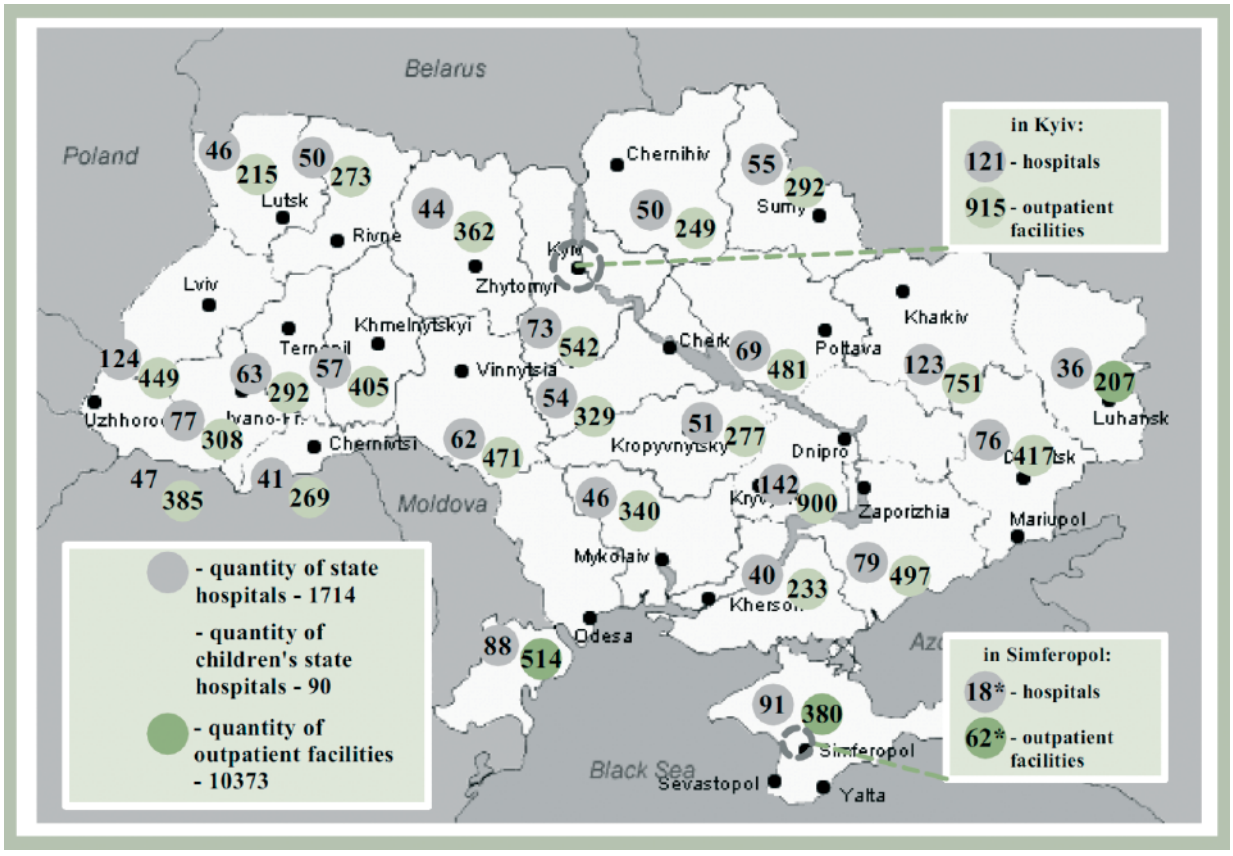

Figure 1.
Urban planning network of hospitals and outpatient facilities in Ukraine (Figure by the author of the paper)

The listed set of these and many other variable needs and requirements of society lead to the renewal of any form of the urban environment, unfortunately, not excluding the historically formed [20–22]. Thus, the dynamic structure and the actual variability of the urban environment ultimately affects the development of the overall urban system, its components, which also include the urban system of pediatric treatment facilities.

2. THE PURPOSE OF THE PAPER

Propose a probable scenario and forecast for the further development of the healthcare system and network of Ukraine the largest country in Europe and the 46th largest country in the world, describe its current state and suggest ways to improve in accordance with global trends. The results can be useful to foreign readers and researchers who are interested in urban planning and architectural issues of the development of world health systems.

3. METHODOLOGY

The study was conducted on the ground of systematic, comprehensive, functional, and historical approaches. Some research methods are used in the paper: inductive statistical, abstract-analytical, comparative and historical analysis method, qualitative and quantitative analysis method, data collection, and systematization from various information sources. It should be emphasized that this method makes it possible to obtain a general vector for the further development of the health care system at the architectural and urban planning level. In the case of Ukraine, he points to the need for a gradual optimization of the number of medical facilities, which will make it possible to use the saved resources more efficiently.

4. THE HEALTHCARE INSTITUTIONS' STRUCTURE OF THE URBAN SYSTEM, ITS COMPOSING NETWORKS, AND PERSPECTIVE VIEWS OF MEDICAL INSTITUTIONS OF UKRAINE

Based on previous research, studying the urban planning foundations of the health care system of the world's major economies in the medical field (Hong Kong, Singapore, the United Arab Emirates, the United States of America, Germany, France, the United Kingdom, etc.), the urban planning system of healthcare facilities is considered in the paper as a complex and dynamic, hierarchical and multilayered structure that integrates and unites medical, administrative, research, medical-educational, medical-industrial and other ancillary subsystems within a defined territory (country, region, area, settlement or part of it). The multi-layered urban planning system of healthcare facilities should reflect the hierarchical structure and subordination of the components of treatment levels and the relevant urban networks of medical institutions and complexes. The main treatment level of the system is proposed to be divided into three components of urban networks, which ensure the functioning of primary, secondary, and tertiary healthcare.

The network of primary healthcare, which provides medical care for children based on family medicine in a variety of primary healthcare (basic and additional), is the first hierarchical step of the urban healthcare system. Family doctors' offices, outpatient clinics, and primary healthcare centers are classified as basic primary care facilities. The most compact and popular form, suitable in the context of urban compacted multi-storey housing for the local organization of doctors work on the site of a residential complex or neighborhood with new residents, the number of which was not taken into account for medical care is the arrangement of family doctors' offices. To calculate, it is proposed to assume that one family doctor delivers medical care to up to 2 thousand people. The outpatient clinic provides for the simultaneous operation of 3 to 5 family doctors, the presence of Procedure Room. Outpatient planning is advisable at the neighborhood or district level. Arrangement of a primary healthcare center is proposed at the city district level. The living-arrangement of family doctors' houses, which lay the groundwork for encouraging medical staff to live and work outside urban settlements, as well as help in the availability of medical care for residents of these areas, is also proposed in rural areas.

It is proposed to organize additional (extra) primary healthcare facilities in the urban environment by integrating this function into diagnostic centers in the network of secondary and tertiary healthcare facilities. This will provide medical assistance throughout the year and around the clock, reducing the burden on the out-of-hospital emergency medical service. Diagnostic centers at maternity hospitals or perinatal centers may serve as an extra space for primary healthcare for children under 1 year. This acquires special interest in cases of complications with the child's health during pregnancy or childbirth doctors can dynamically monitor the development of a sick child.

At the level of secondary healthcare, this study proposes the functioning of a network of secondary healthcare facilities, which includes six main types of hospitals, which differ in the degree of treatment intensity, technical and personnel infrastructure. Multi-field active treatment hospitals, hospitals for elective treatment of chronic patients, rehabilitation hospitals, hospices, medical and social care hospitals, maternity hospitals, as well as diagnostic centers at these hospitals and many specialized medical centers (dental and others) are included in the network of secondary healthcare. The main distinguishing feature of secondary hospitals is their age-specific universality, they offer treatment organization for patients of all ages both adults and children. The architectural and planning approach to the hospital universal age organization can be represented by integrating children's wings (or wards) near or in the middle of the building (floor) from a certain treatment area, sheet structure of departments, cooperation and blocking a separate children's building with the main hospital, a cluster association of autonomous hospital buildings.

Multi-field active treatment hospital is the basic hospital in secondary healthcare delivery, which provides round-the-clock medical care to patients with acute conditions that require a high intensity of treatment and care. This type of hospital is best designed to serve up to 400 thousand people, of which the average percentage of children is 20% (80 thousand people). The decision on the number of people to be treated within intensive care hospital depends on the specific local conditions (a type of area, size of locality, demographic, climatic, epidemiological, and other characteristics) as well as conditions for the hospital organization (capital and tenant improvements of the hospital building, design of a new treatment complex). The provision of refresher courses of treatment or after-treatment, using conventional

management, without the need for intensive means and equipment according to the treatment procedure, is the main purpose of the hospital for the planned treatment of chronic patients.

The purpose of the rehabilitation hospital is to provide recovery conditions for a person after illness or injury, to prevent disability, and/or rehabilitation of disabled people who need special equipment. The hospice is designed to provide palliative care and psychological support to terminal (fatal case) patients who need special equipment to deliver such care and attention, as well as specially trained, mostly nursing staff. The hospital of medical and social care provides for the organization of care and provision of social and palliative care for chronic patients with a minimum supply of diagnostic and treatment equipment, paramedics, and social workers. Maternity hospitals are given a separate status in the urban network of secondary healthcare institutions and should be gradually upgraded to perinatal centers (full cycle from the problems solving of female and male fecundation to the birth of a child). Despite a gradual trend to reduce the length of stay for a parturient woman in hospital (from 5–7 days during normal Soviet childbirth to 3 days currently in Ukraine, to 1 day in European countries) we can talk about the need to increase the throughput of these hospitals.

The urban network of tertiary care facilities, the operation of which is proposed at the national level and within the hospital regions, is responsible for the organization of tertiary (specialized) medical care. The proposal to arrange hospitals specialized exclusively in child care is put forward at the level of the urban network of tertiary care facilities. Best specialists` concentration in pediatric treatment is offered in tertiary pediatric hospitals. These hospitals must, first of all, receive modern medical equipment and the implementation of advanced medical technologies.

Children's hospitals that are responsible for the formation of a children's therapeutic complex at the level of the urban network of tertiary health care should receive the status of key regional and national centers for the development of children's health. The university hospital is offered as a new type of tertiary care hospital for Ukraine. It provides a comprehensive combination of therapeutic, diagnostic, rehabilitation, training, research, and experimental functions. University hospitals receive republican status and are designed to serve the population of the whole country, without connection with the place of residence of patients. The capacity of the university hospital should be at least 800 inpatient beds.

5. THE SYSTEM STRUCTURE OF PEDIATRIC TREATMENT FACILITIES

The paper defines a pediatric treatment facility as the territorial spatial combination of treatment facilities and integrated departments providing medical care for children. The primary level pediatric treatment facility provides for the treatment of children in a variety of primary healthcare facilities operating on the principles of family medicine. The pediatric treatment facility of the secondary medical level provides for the organization of treatment of children in the integrated children's departments of hospitals of the network of secondary medical institutions. The pediatric treatment facility of the tertiary level of medical care unites specialized children's hospitals and integrated children's departments in specialized institutions of the network of tertiary medical hospitals.

The system of a pediatric treatment facility is considered in the research as a complex and dynamic, hierarchically subordinated integrated subsystem of the general urban-planning system of healthcare institutions. It forms the integrity of pediatric medical institutions and integrated children's wards within the networks of primary, secondary and tertiary levels of healthcare within a certain territory (country, region, district, settlement), which provides interconnected territorial and spatial functioning and interaction with ancillary medical services, research, medical-educational, medical-industrial and administrative institutions within the hospital districts and hospital regions. The system of pediatric treatment facilities is designed to provide a full cycle of treatment of children in medical institutions at the primary, secondary and tertiary levels of healthcare.

6. FORECASTING THE TERRITORIAL AND SPATIAL DEVELOPMENT OF THE SYSTEM OF PEDIATRIC TREATMENT FACILITIES AT THE LEVEL OF THE URBAN NETWORK OF PRIMARY HEALTHCARE FACILITIES

To formulate a proposal for forecasting the territorial and spatial development of the urban system of pediatric treatment facilities at the level of the urban network of primary care facilities requires a preliminary analysis of the actual indicators of general practitioners per 100,000 population in developed countries. According to the WHO Regional Office for Europe, the average number of GPs per 100,000 population is 80 at the beginning of 2020 in the EU. France (159), Belgium (112), Georgia (118), Lithuania (89), and Luxembourg (88) have the highest ratios. The smallest are in Belarus (9), Bosnia and Herzegovina (20), Poland (22), Tajikistan (28) [22, 23]. At the same time, the figure is 36 in Ukraine, which indicates deep underdevelopment of the primary-level urban development network. It should be noted that today in Ukraine the functioning of the urban network of primary healthcare facilities is provided by only two types of institutions outpatient clinics and primary healthcare centers.

So, based on the actual number of the available population of Ukraine for 2021, the state needs to increase the number of general practitioners in 33,591 people, obtained by the formula:

Number enumerated population / 100 000 x 80 =

=41 988 670 / 100 000 x 80 = 33 591

Based on the obtained data, today in Ukraine it is necessary to increase the urban network of primary care facilities, expand the range of types (in the urban environment at the basic level to introduce family doctors' offices; at the auxiliary to provide primary care in secondary and tertiary care, perinatal centers, in rural areas to house family doctors) to a state that will ensure the ability to work the specified number of primary care physicians. The increase in the number of primary healthcare facilities should be based on the number and density of the available population in a given locality, based on the optimal workload per family doctor, which is offered up to 2,000 persons. To achieve the level of provision and accessibility of the population to primary healthcare services in the largest, large and great cities of Ukraine, it is recommended to integrate all basic and auxiliary types of primary healthcare institutions into the urban environment, which should be located taking into account pedestrian accessibility.

In the conditions of new high-rise multi-apartment housing construction, it is recommended to organize offices of family doctors or medical ambulance stations in a built-in-attached way on the ground floors of buildings based on the expected and projected number of residents of the residential complex. Returning to the issue of forecasting the territorial and spatial development of the urban planning system of pediatric treatment facilities, it should be noted that the forecasting is based on three complementary sources of information about the future: proposals for promising types of medical institutions and the relevant regulatory support of three components of the urban planning system; progressive experience of the functioning of components of medical establishments of the specified networks (primary, secondary and tertiary levels of medical care) in the leading countries of the world with conditional extrapolation of tendencies and laws of development; forecast perspective of the population of Ukraine.

The simulation result presented in the following paragraph demonstrates the probable nationwide dynamic scenario for the development of the urban network of primary healthcare facilities. The model scenario contains time prospects projected for 2030, 2040, 2050, 2060 and 2100. Based on the extrapolation of the development of the urban healthcare sys-

Table 1.
Proposals of dynamic scenarios of the territorial and spatial development of pediatric treatment facilities at the national level of organization of the urban network of primary healthcare facilities

Name	2030	2040	2050	2060	2100
Population / optimistic (max) case	42.0 million	40.0 million	38.3 million	36.0 million	37.5 million
Number of primary care physicians	33 600	32 000	30 640	28 800	30 000
Population / **optimal (opt) case**	**39.8 million**	**39.8 million**	**33.6 million**	**30.8 million**	**24.0 million**
Number of primary care physicians	**31 840**	**29 600**	**26 880**	**24 640**	**19 200**
Population / **pessimistic (min) case**	39.0 million	36.0 million	32.2 million	27.0 million	15.0 million
Number of primary care physicians	31 200	28 800	25 760	21 600	12 000

tem, as well as taking into account the historical dynamic series of domestic and foreign practices in the operation of medical institutions, it is possible to identify a scenario for the development of a children's therapeutic complex within the urban network of primary medical care facilities.

The scenario of the territorial and spatial development of the network is transformed into the forecasted future taking into account the intensification and extensiveness of treatment methods and technologies, without abrupt changes in development parameters. The United Nations parametric forecast data on the population of Ukraine contain three possible development schemes: optimistic (max), optimal (opt), and pessimistic (min) variants [22, 23], which together with the average indicators of family physicians in EU countries [13] create the basis and the necessary basis for the formation of forecast proposals for dynamic scenarios for the development of pediatric treatment facilities at the national level of the organization of the urban network of primary care facilities (Table 1).

Based on the tabular data obtained, the main dynamic scenario is proposed that the spatial development of the system of children's therapeutic facilities at the national level of the organization of the urban network of primary healthcare institutions should choose a scenario based on the optimal (opt) population of Ukraine, that it is possible to anticipate the medium-, long-term and over-the-long-term dynamic pattern. The medium-term prospection of the scenario for 2030 predicts a population of 39.8 million people and the corresponding optimal number of family doctors is 31.84 thousand people. The long-term prospection of the scenario for 2050 forecasts the current number of Ukrainians at 33.6 million people, while the indicator of the optimal number of primary care physicians is reduced to 26.88 thousand people. Finally, the long-term prospect of a dynamic scenario for 2100 assumes a population of 24 million in Ukraine, which in turn reduces the required number of family physicians to 19.2 thousand.

The model of children's therapeutic complex, indicators of the number of doctors in the world, summarized actual and forecast data for forecasting the territorial and spatial development of the urban system of pediatric treatment facilities at the level of an urban network of primary care facilities are presented in Figure 2.

7. FORECASTING THE TERRITORIAL AND SPATIAL DEVELOPMENT OF THE SYSTEM OF PEDIATRIC TREATMENT FACILITIES AT THE NATIONAL LEVEL OF HOSPITAL URBAN NETWORKS

The following components of the system of pediatric treatment facilities are hospitals and diagnostic centers at hospitals of urban networks of secondary and tertiary medical care intended for the treatment of children. The general model of the components of the system of pediatric treatment facilities at the secondary medical level provides for the functioning of children's wards in hospitals that differ in the degree of intensity of treatment: multi-field intensive care hospital, rehabilitation, and elective treatment hospital, health and social care hospital, and perinatal and medical secondary care centers. At the tertiary urban level of medical care, the components of the system of pediatric treatment facilities include children's hospitals and departments within the university and other specialized hospitals, medical centers of tertiary care. The forecast related to the development of the system of pediatric treatment facilities at the level of urban networks of the secondary and tertiary levels is advisable to carry out within the forecasting of the deployment of the national hospital level. The generalized approach is due to a retrospective analysis of experience and prevailing global trends of extrapolation of hospital networks, which together indicate a gradual involution of specialization (including children) of hospital structures and their gradual transition to a state of multifunctional medical associations, complexes, and clusters. From this point of view, first of all, it is necessary to refer to the actual indicators of the total number of hospital beds per 100,000 population in the developed world countries [16]. According to the European Regional Office of the WHO, the average number of hospital beds per 100,000 population in early 2020 in the EU is 527.43. The highest provision indexes are observed in Monaco (1458.38), Belarus (1104.56), Germany (827.77), the Russian Federation (817.53), and Austria (764.7). The lowest indexes are in Denmark (307.39), Ireland (276.13), Sweden (259.42), Turkey (265.64) [16]. This index is 879.81 in Ukraine in 2020, which indicates the redundancy of the bed stock in the country and the need for further optimization of the number of hospitals and inpatient beds in them. Based on the actual number of present-in-area population in Ukraine, by 2020 our state needs to reduce the number of hospital beds by European standards,

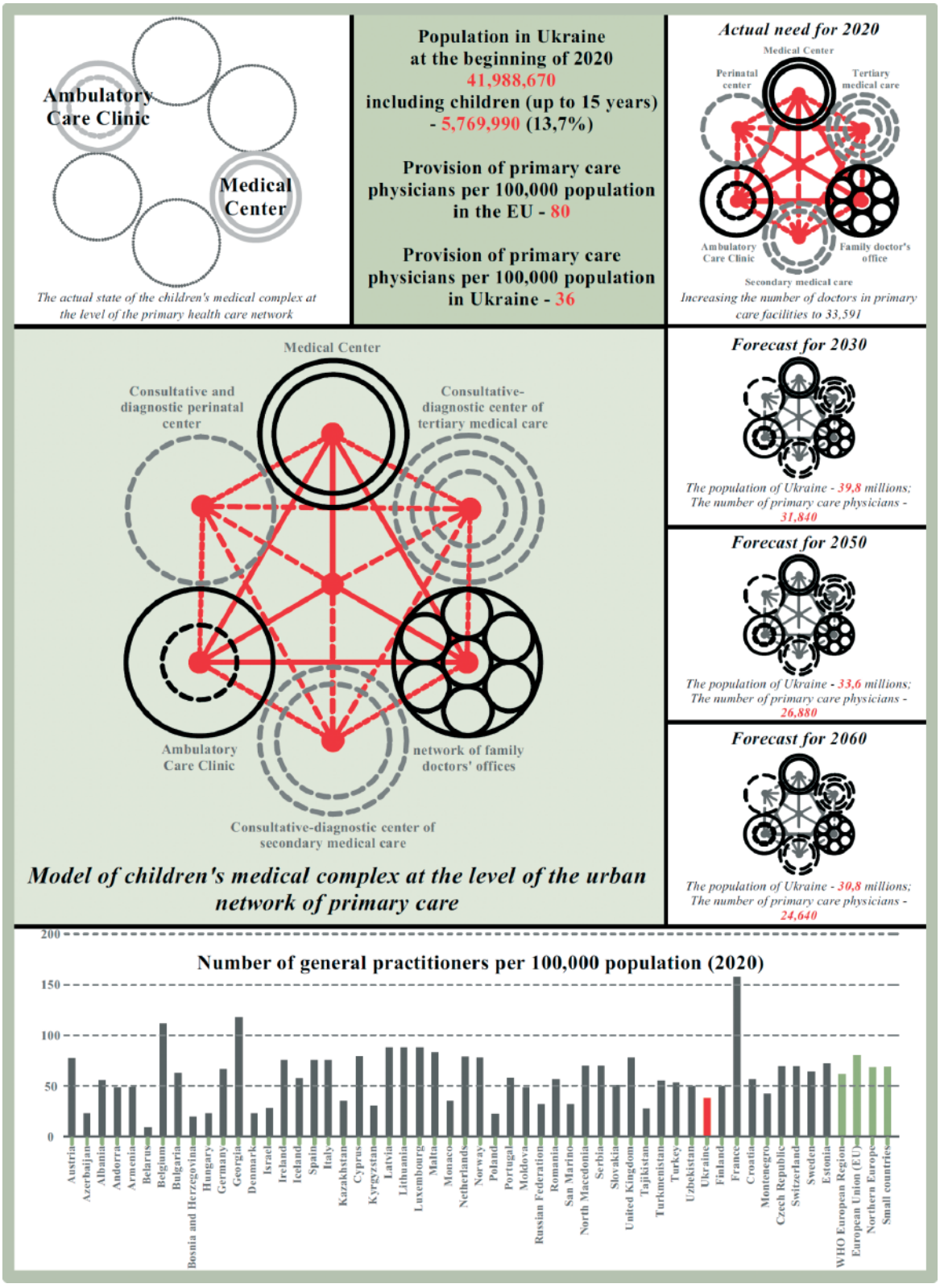

Figure 2.
The model of children's therapeutic complex, indicators of the number of doctors in the world, summarized actual and forecast data for forecasting the territorial and spatial development of the urban system of pediatric treatment facilities at the level of an urban network of primary care facilities (Figure by the author of the article)

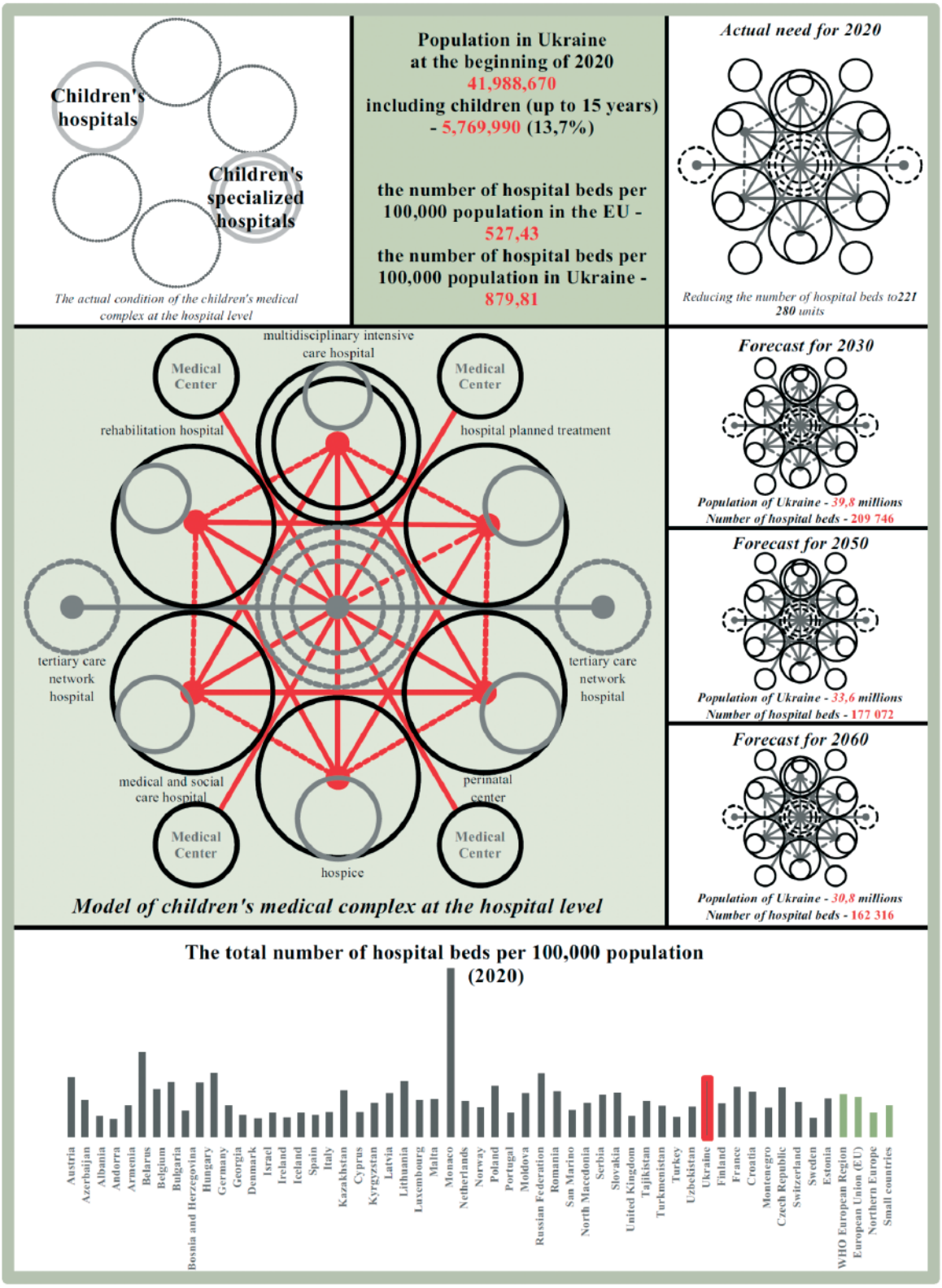

Figure 3.
The model of children's therapeutic complex, indicators of the total number of hospital beds per 100,000 population in the world, summarized actual and forecast data for forecasting the territorial and spatial development of the urban system of pediatric treatment facilities at the level of an urban hospital network (Figure by the author of the paper)

Table 2.
Proposals for dynamic scenarios of the territorial and spatial development of pediatric treatment facilities at the national level of hospital urban networks organization of secondary and tertiary healthcare

Name	2030	2040	2050	2060	2100
Population / **optimistic (max) case**	42.0 million	40.0 million	38.3 million	36.0 million	37.5 million
Total number of beds in hospitals	221 340	210 800	201 841	189 720	197 625
Population / **optimal (opt) case**	**39.8 million**	**37.0 million**	**33.6 million**	**30.8 million**	**24.0 million**
Total number of beds in hospitals	**209 746**	**194 990**	**177 072**	**162 316**	**126 480**
Population / **pessimistic (min) case**	39.0 million	36.0 million	32.2 million	27.0 million	15.0 million
Total number of beds in hospitals	205 530	189 720	169 694	142 290	79 050

which are 221,280 inpatient beds (actually the figure is 369,420). The result is obtained by the formula:

Number enumerated population / 100 000 x 527 =

41 988 670 / 100 000 x 527 = 221 280

It is recommended to optimize the actual hospital fund by the proposed structural structure of urban hospital networks, which will eliminate duplication of hospital functions within one territory, including by elimination of the age distribution of patients in hospitals network of secondary care facilities. According to the structural analogy of forecasting the dynamic development of the components of the system of pediatric treatment facilities at the level of the urban network of primary care facilities, the section offers possible models of scenarios for the deployment of hospital urban level of healthcare in Ukraine, which is presented in Table 2.

Based on the obtained tabular data, the main dynamic scenario of the dynamic territorial and spatial development of pediatric treatment facilities system at the national level of the hospital network is proposed to choose the optimal (opt) scenario of the projected population of Ukraine and the corresponding need for total hospital beds. The dynamics of the medium-term prospecting scenario for 2030 forecasts a population of 39.8 million people, which corresponds to 209,746 units of the optimal number of hospital beds. The long-term prospect of a dynamic scenario for 2050 forecasts the number of Ukrainians at 33.6 million people, while the optimal number of hospital beds is reduced to 177072 units. In addition to the long-term prospect of the scenario for 2100 predicts a population of 24 million in Ukraine, which in turn leads to a reduction in the number of hospital beds to 126480 (Fig. 3).

The model of children's therapeutic complex, indicators of the total number of hospital beds per 100,000 population in the world, summarized actual and forecast data for forecasting the territorial and spatial development of the urban system of pediatric treatment facilities at the level of an urban hospital network (Figure by the author of the paper).

8. CONCLUSIONS

Summarizing the forecast calculations of the territorial and spatial development of the system of pediatric treatment facilities in the context of evolutionary patterns and changes in the urban system of health care facilities, it should be emphasized that both systems are open. Thus, the emergence of nonlinear effects due to the characteristic nonlinearity components of networks progresses, the progressiveness or involution of certain types of medical institutions, the emergence of new, more advanced structures; increasing the extrapolation of medical functions of medical institutions, their merging and the formation of polyphonic medical complexes, etc. possible branches of events are allowed in the process of their temporal and spatial development. In addition to the expected urban planning factors of permissible deviations of the forecast branching of pediatric treatment facilities system, which have the potential to form the basis for an abrupt change in the characteristics of the entire medical system, there are also some others internal and external probable bifurcation points, which in turn will correlate the deployment of the forecast scenario. The changes are related to the bifurcation points: socio-demographic and migration; disease distribution; entry of new diagnostic and treatment methods; development of transport infrastructure (increase accessibility radii at hospital level), etc. predictable and unpredictable events and phenomena. From this perspective, the urban system of pediatric treatment facilities must gradually respond to dynamic changes, phenomena, and

processes in the state and society, acquiring synergistic features of self-organization, self-improvement by changing needs and expectations of people, age groups, and the community as a whole.

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