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## THE STRUCTURE AND DYNAMICS OF MEDICAL PERSONNEL IN POLAND AND IN THE SILESIA VOIVODSHIP: MAIN TENDENCIES AND CHALLENGES

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### ABSTRACT

Health care is an important area of social infrastructure with its own specifics. In recent years, healthcare has been actively developing, using new advances in biomedical technology and pharmacy. Despite of the serious achievements in the reforms of the healthcare in Poland in last decades the important problems and disparities exists on the distribution of the medical personnel in the country and some regions.

The purposes of the article were: the adjustment of the importance of the strategical management and human resources management in healthcare; the study of the characteristics of the labor market in the field of healthcare in the Silesian Voivodship and to compare with general situation in Poland; the analysis of the structure and dynamics of the medical personnel in the Silesian Voivodship taking into account main tendencies and challenges in the healthcare.

In the article the features of the structure and dynamics of medical personnel were considered in Poland and Silesian Voivodship, the set of the important indicators such as: education level of the different categories of medical personnel; number of students of medical universities; age structure of medical personnel; structure of specialization of doctors number of consultations of specialist doctors received by patients; main indicators of the healthcare system (specification and number of wards; beds in wards; inpatients; out-patients of day care; average length of stay in hospital in days, etc.) were analyzed and comparative analysis of these indicators was carried out.

Based on the analysis the position of Silesian Voivodship in the point of structure and dynamics of the medical personnel was evaluated and recommendations were proposed.

### KEYWORDS

healthcare, main indicators, personnel, analysis, tendency

## Introduction

Health care is an important area of social infrastructure with its own specifics. In recent years, healthcare has been actively developing, using new advances in biomedical technology and pharmacy. Nowadays healthcare has global character and follows to the tendencies of the development in leading biggest and most efficient economic systems (Wright, 2005). The strong international competition and use the national advantages had started after the Second World War, when national health system became part of national safety and developed with other perspective sectors of industries and scientific programmes.

The rapid growth of innovations in pharmacy, medicine, medical technology (discovery and mass production of antibiotics, blood transfusion, development of vaccines, creation and use of resuscitation apparatus for resuscitation, first attempts at transplantation of organs and tissues, use of artificial heart and artificial kidney apparatus in complex operations, discoveries in the field of medical genetics, development of new medicinal means in the treatment of cancer, the appearance of reproductive medicine, medical experiments in space, modern diagnostic methods, computers and information systems, etc.) has led to fierce rivalry and intense competition between countries that could be leaders in certain fields or already held leading positions (Health care cost, quality, and outcomes, 2003).

Many serious studies in medicine, especially their potential use in space or military projects, were classified as secret because they were of strategic importance. Due to the serious political, economic and scientific confrontation between the former USSR and the socialist countries, on the one hand, and the United States, and NATO countries, on the other hand, strategic planning in medicine primarily affected the scientific sphere (Wright, 2005, Kabene, 2006).

A network of medical research institutes has appeared and developed in the USSR aimed at the development of such areas as emergency surgery, cardiac surgery, neurosurgery, transplantology, space and military medicine, radiation medicine, toxicology. Some directions also developed in the countries of the socialist bloc. Similar directions developed actively in the USA and other leading western countries, where a network of powerful research institutes was also created and multidisciplinary groups of scientists worked on new promising projects (Swayne, 2006).

The analysis of the human resources and implementation of strategic management of human resources in a medical organization is one of the most important components of the medical organization development strategy. Strategic management in general and strategic management of human resources, in particular, in medical organizations began to be applied relatively recently, only 20-30 years ago. Moreover, the first projects related to the implementation of strategic management in the healthcare system were mainly implemented in the United States, where conditions were created for high competition in the medical services market and large national medical corporations and international networks of medical and pharmaceutical companies appeared. It should be notice, that in the USA and in other countries after the Second World War, and in the USSR and since the mid-20s of the last century, medium-term and long-term planning was carried out in various sectors, including healthcare. However, healthcare strategic management as we see it today was introduced much later. The prerequisites and reasons for the introduction of strategic management in healthcare were the

theory of strategic management developed at that time and established itself in other sectors, on the one hand, and increased competition in commercial medicine and the pharmaceutical industry, on the other hand.

Nevertheless, there are certain features associated both with the structure of the morbidity of the population, and with the provision of medical personnel and the material and technical base of medical institutions. The necessity for medical personnel is often planned in connection with the analysis of the structure of the population's morbidity and its dynamics, as well as the standards related to the provision of beds and the existing material and technical base of medical and preventive and outpatient facilities.

The problem of increasing medical organizations efficiency in Europe and the USA, which has begun to be actively discussed since the mid-70s, has led to the necessity to develop and implement various approaches and tools for managing healthcare organizations. There was a gradual formation of medical management areas and the transformation of medical organizations into corporations, the formation of various networks of medical organizations, consortia with pharmaceutical enterprises and medical research institutes. This process was particularly active in the United States, where, for historical and economic reasons, many areas of management were created, such as strategic management, corporate governance, organizational culture, etc. (Kiliková, 2006, Armstrong, 2016, Ondruš, 2017).

In Poland, for example, it was the implementation of certain important scientific programs, diagnosis and treatment of complex diseases, institutes are created at the national level, such as the National Institute of Cardiac Surgery, the National Cancer Institute, etc. Regional medical centers or university clinics are provided at the regional level. In such medical research institutes, regional centers and university clinics, the level of requirements for the training of medical personnel, their competencies and experience is higher than in ordinary polyclinics and hospitals (Polskieszpitale, 2015).

The purposes of the article are: the adjustment of the importance of the strategic management and human resources management in healthcare; the study of the characteristics of the labor market in the field of healthcare in the Silesian Voivodship and to compare with general situation in Poland; the analysis of the structure and dynamics of the medical personnel in the Silesian Voivodship taking into account main tendencies and challenges in the healthcare.

Main results and findings.

In Poland, as in other EU countries, doctors and other medical personnel have the right to work in the non-state sphere. Under the influence of various political, economic and administrative reforms in the economic and health sectors, various non-governmental medical centers and institutions are actively developing in Poland, which also strive to be competitive in the medical services market and attract high-level professionals for this. In addition, there is a wide network of private medical offices where doctors consult patients privately (Ustawa z dnia 30 sierpnia 1991 r. o zakładach opieki zdrowotnej; Ustawa z dnia 5 lipca 1996 r. o zawodach lekarza i lekarza dentystry; Ustawa z dnia 5 lipca 1996 r. o zawodach pielęgniarzy i położnej).

In this regard, the problems of medical personnel management and the strategic management of human resources in the healthcare system should be inextricably linked with the analysis of the development of both the healthcare system as a whole and its components, the specifics of regulation and financing, the formation of the medical services market, and the socio-demographic situation, characterizing the demographic composition and health status of the population, the structure of the morbidity of the population, the level of accessibility of medical services and medical drugs for certain segments of the population.

In Poland, compulsory medical insurance of the population is in effect, the main expenses for the diagnosis and treatment of patients come from (NFZ - National Health Fund), while both state and non-state medical institutions sign contracts with this fund to cover the costs of providing basic medical services provided for compulsory health insurance program. In addition, part of the capital expenditures for the development of state and regional healthcare institutions comes from state and local budgets. Also, various medical institutions can participate in various EU programs and receive additional financing and equipment under various grants. The possibilities of financial autonomy of various medical institutions allow them to earn additional funds through paid services, these additional financial resources can be used both for the development and expansion of the material and technical base of the medical institution, and for the motivation of medical personnel. Despite the possibility of using modern approaches to managing medical organizations in Poland, there are quite a lot of state and local medical institutions that are unprofitable or have significant debts. This leads to the fact that as a result of the restructuring, consolidation or reduction of such unprofitable medical organizations, part of the medical staff leaves and is forced to look for work in other hospitals or clinics (Polskie szpitale, 2015).

Another important feature is that recently there has been an inherent high mobility of medical personnel in the medical services market in the EU. So, quite a lot of young specialists - doctors and nurses from Poland are trying to find work in the healthcare sector in other, more developed EU countries, where the salaries of medical personnel are several times higher than in Poland. High mobility of medical personnel from Poland and other new EU member states to Western Europe is facilitated by a more simplified procedure for recognizing medical education for EU member states, the ability to continue medical education or conduct research in other countries of the European Union through various grants or scholarships, and the lack of their own medical personnel, especially for the primary health care system in Western Europe. Since part of their own medical personnel leaves Poland for Western Europe, due to the need for medical specialists for the Polish population, doctors from Ukraine and Belarus come to the country who are trying to find work in the healthcare sector in Poland. In addition, part of the youth from Ukraine and Belarus, as well as various third countries, enters various medical universities in order to work in the healthcare sector in Poland later. Thus, these trends should also be taken into account when analyzing the dynamics of the medical services market in Poland, as well as the factors affecting the formation of demand and supply in the labor market for medical specialists in the country and abroad (The demand for labour in 2017).

It should be mentioned that medical science and health became popular education programs in Poland during last decade (Higher education institutions, 2018). The rapid growth of number of students (including foreigners) was observed in medical universities in Poland. In 2000-2001 the number of students in medical universities was

29,5 thousand, in 2005-2006 this number was 48,8 thousand, and in 2017/2018 it was more than 64 thousand. Thus, during 2000-2018 the total number of students in the medical universities in Poland increased twice.

The crucial moment in the reforms in sphere of education of the specialists for healthcare in Poland was the implementation of the higher education for some types of medical staff, such as: nurses, midwives and paramedics (emergency workers).

In table 1, the dynamics of education level for these types of medical personnel in Poland is presented for 2015-2017. Thus, we can see that more than 40% of nurses and midwives possessed higher education in healthcare, for the paramedics the share of staff with higher education was less than 40%.

Table 1. The education level of medical personnel in Poland for 2015-2017 (in %)

	2015	2016	2017
Nurses			
Secondary education	57	56	57
Others with higher education	31	31	27
Master's degree	12	13	15
Midwives			
Secondary education	55	54	53
Others with higher education	29	29	28
Master's degree	16	17	18
Paramedics (emergency workers)			
Secondary education	67,3	62,8	60,09
Others with higher education	28,2	33,1	35,6
Master's degree	4,4	4,1	3,5

Source: developed by author based on the data from Health and health care in 2017. Statistics Poland. Warszawa, 2018.

Medical staff, such nurses, midwives, paramedics with higher education in healthcare can carry out some administrative functions and manage personnel. The systems of degree and non-degree postgraduate programs are very important in the area of healthcare and medical sciences. For many specialists from this sphere, such as physicians, nurses, emergency workers, etc. it is need to possess postgraduate programs or to graduate courses with some kind of specification. In hospitals that are part of the medical universities or departments of health faculty some categories of teaching staff should have PhD degree in related sciences or should have the title of Professor or Associate Professor. In the end of 2017 the number of doctoral students in medical sciences was 3258 (or 7,9% from total), in pharmaceutical sciences it was 391 (0,95%) and in health sciences it was 724 (or 1,75%). In 2016-2017 the number of students in non-degree programs made up 1635 persons in medical universities (or 1,03% from total number of students in non-degree programs) and 25660 persons in the Medical Center of Postgraduate Education (or 16,25% from total number of students in non-degree programs).

In table 2 the number of students of medical universities is presented in Poland for 2017. Thus, in some voivodships the share of students studied in local medical universities exceeds 10% from total number of students in these voivodships. In 2017 in Silesian voivodship 10218 students studied in Medical University of Silesia in Katowice, it was 9,21% from total number of students in this voivodship.

Table 2. Number of students of medical universities in Poland in 2017

Name of university	Number of students	Share of students in medical university in total number of students in voivodship, %
Wrocław Medical University	6201	5,1
Medical University of Lublin	7012	10,05
Uniwersytet Medyczny w Łodzi	9133	10,72
Medical University of Warsaw	9638	3,89
Medical University of Białystok	4984	15,61
Medical University of Gdańsk	5429	6,67
Medical University of Silesia in Katowice	10218	9,21
Poznań University of Medical Sciences	7259	5,57
Pomeranian Medical University in Szczecin	4401	11,28

Source: developed by author based on the data from Higher education institutions and their finance in 2017. Statistics Poland. Warszawa, 2018.

In 2017 in Silesian Voivodship 16 higher education institutions prepared specialists for healthcare, the biggest and more experienced was Medical University of Silesia in Katowice, but also there are 14 higher education institutions which have different departments or faculties specialized on health care and social care and one specialized higher health care school in Sosnowiec. The total number of students which studied broad field of education programs "Health and welfare" in Silesian voivodship made up 16017 persons or 14,43% from total number of students in this voivodship. In 2017 in Silesian voivodship the number of students who studied narrow field "Health" was 15865 persons or 14,29% from total number of students in this voivodship, in which there were: 5039 persons in group "Nurses and Midwives", 4351 persons in group "Medical sciences or General Medicine", 3369 persons in group "Therapy and rehabilitation", 1586 persons in group "Technologies associated with diagnostics and treatment", 819 persons in group "Pharmacy" and 701 persons in group "Dentists". Thus, the capacity for the renovation of the human resources in healthcare in Silesian Voivodship is relatively good in comparison with other voivodships where share of students in higher medical schools or medical universities is less. The problem of renovation of medical personnel in Poland is relatively acute, because many experienced specialists moved to medical or health care institutions abroad, where wages were essentially higher than in Poland.

In table 3 the age structure is presented for some group of medical personnel in 2017. It is clear seen that the proportion of the doctors and dentists in age group "65 years and more" is essentially high, two times more in comparison with other health staff, such as nurses and midwives.

Table 3. Age structure of medical personnel in Poland in 2017 (%)

Age	Doctors	Dentists	Nurses	Midwives
under 35 years	18,62	21,65	9,62	15,79
35-44	15,17	18,98	17,53	15,79
45-54	22,07	22,63	33,68	31,58
55-64	21,38	15,82	28,52	26,32
65 years and more	22,76	20,92	10,65	10,53

Source: developed by author based on the data from Health and health care in 2017. Statistics Poland. Warszawa, 2018.

In Silesian voivodship the share of doctors entitled to practice the medical profession in age group "65 years and more" is relatively high due to the females, also in all age groups doctors-females exceeds doctors-males (Fig. see Silesian voivodship, map doctors and nurses in 2016).

Consider the features of the development of the medical services market in Poland and in the Silesian Voivodship over the past few years(Health and health care in 2017).

For the period 2015-2017 in Poland the number of hospitals did not change and amounted to 957, while the number of beds and treated patients (inpatients) changed but not significantly. This, for the period 2015-2017 the number of treated patients increased by 0,5%, and the number of hospital beds decreased by 0,2%. In 2017, the number of treated patients in Poland was 7829012. Silesian Voivodship is one of the largest voivodships in terms of population, with a high level of urbanization. The number of hospitals in the Silesian Voivodship was 155 (16% of the total number of hospitals), and the bed capacity in 2017 amounted to 25091 beds, or 13% of the total number in the country. The number of treated patients in the Silesian Voivodship in 2017 was 933502 people, or 12% of the total number of treated patients in the country. For the period 2016-2017 in the Silesian Voivodship, the number of treated patients decreased over the period 2016-2017 by 0,11%, and the bed capacity decreased by 1,3%.

In 2017, 7491349 people were treated and discharged in Polish hospitals, 1354831 being children under 18 years of age (18% of the total). In 2017, 897870 people were treated and discharged in hospitals of the Silesian Voivodship that is 12% of the total number of this indicator in Poland. For the period 2016-2017 the Silesian Voivodship witnessed a slight decrease of 0,6% in the number of patients treated and discharged from hospitals. The number of children under 18 years of age treated and discharged from hospitals was 120880 in 2016, and in 2017 this indicator decreased by 0.2% and amounted to 145056 people. In 2016-2017 the proportion of children under 18 years of age treated and discharged in hospitals of the Silesian Voivodship amounted to 12% of the total number of patients treated and discharged from hospitals in this province. In 2016 the total number of patients in Poland, who received consultations in the framework of primary health care amounted to 166413 people, that is 0,8% higher than this indicator in 2015. In 2017, the total number of patients who received consultations in the framework of primary health care aid increased by 1,7% compared with the previous year, and amounted to 169376 people. It should be noted that of the total number of patients who received consultations in the framework of primary health care, 22% were children under 18 years of age. In 2017 in the Silesian Voivodship, 20233 patients received consultations in the framework of primary health care, among them 21% were patients under 18 years of age.

In 2016, 21299 people received medical care in polyclinics and offices at hospitals in Poland, that is 4,34% more than in 2015. For the period 2016-2017 this figure grew by only 1,7% and amounted to 21665 people. More than 77% of patients received medical care in clinics located in cities. In the Silesian Voivodship, the number of patients who received medical care in polyclinics and offices at hospitals amounted to about 13% of the total number of such consultations in Poland, for example, in 2016 in the Silesian Voivodship, 2873 people received medical care in clinics and offices at hospitals, and in 2017, this indicator amounted to 2849 people.

Table 4. Number of consultations of specialist doctors received by patients in Poland and in the Silesian Voivodship, for 2016-2017

Year	Total	Of which									
		in thous.	Internal diseases	pediatric	gynecologically-obstetric	surgical	tubercular and pulmonary	dermatology	ophthalmological	otology/otology	mental health
Poland											
2016	150660	3423	1391	13319	20999	2852	6731	11484,9	7451	5770	34539
2017	150813	3544	1503	13067	20983	2799	6677	11404,2	7422	5807	34531
Silesian Voivodship											
2016	19387	195	75	1676,5	2912	375	884	1560	957	688	4128
2017	19231	210	87	1621	2921	355	853	1555	941	700	4163

Source: developed by author based on the dataHealth and health care in 2017. Statistics Poland. Warszawa, 2018.

As follows from the analysis of the data presented in table 4, the total number of specialized consultations in Poland for the period 2016-2017 increased by 0,1%, while in the Silesian Voivodship it decreased by 0,8%. At the same time, for certain types of specialized consultations, significant changes occurred in 2016-2017 both in Poland and in the Silesian Voivodship. For example, in Poland the number of consultations of pediatricians in general increased by 8% in 2017 compared to 2016, and in the Silesian Voivodship for the period 2016-2017 the increase in the number of consultations with pediatricians was more than 15%. In general, the share of consultations of pediatricians conducted in the Silesian Voivodship amounted to just over 5% of the total number of consultations conducted by pediatricians in Poland.

Table 5 presents data on the main indicators of the healthcare system in the Silesian Voivodship for 2017.

In 2017, the number of hospital departments in the Silesian Voivodship was 969, that is 10 departments less than in 2016. The hospital fund for patients under 18 years old amounted to 3985 beds in 2017, or 16% of the total. For the period 2016-2017 the number of available beds intended for patients under 18 years old decreased by 2,23%.

Table 5. Data on the main indicators of the healthcare system in the Silesian Voivodship for 2017

Specification of wards	Number of wards	Beds in wards		Inpatients, in thous		Out-patients of day care, in thous.	Out-patients of day care, in thous.
		Total	of which for children up to age 18	Total	of which for children up to age 18		
Total	969	25091	3985	990,2	158,1	338,2	6,0
Children's Surgery	15	290	290	21,3	21,3	0,9	2,4
General Surgery	101	2527	-	105,1	0,0	6,1	5,2
Maxillo-facialSurgery	3	46	-	1,2	0,1	0,0	3,6
Trauma-orthopedicSurgery	64	1564	85	65,7	3,7	3,0	5,1
Internalmedicine	81	3310	-	122,2	0,0	0,9	6,9
Infectiousdiseases	7	213	-	7,1	0,2	0,0	7,9
Dermatology	12	232	19	6,4	0,6	0,1	8,3



Endocrinology	14	212	61	11,1	3,4	2,0	4,3
Gastrologic	11	281	68	14,2	3,3	0,7	5,2
Geriatrics	13	337	-	8,2	-	0,1	9,5
ObstetricsandGyne- cology	53	1910	37	116,5	3,5	9,7	3,7
Tubercularandpul- monary	26	1132	171	28,9	2,6	1,2	8,5
Hematology	6	159	-	7,6	-	4,3	5,5
Intensive care (anesthesiology and intensive care)	52	459	89	13,2	1,1	0,1	9,0
Cardiosurgery	6	175	28	8,4	0,5	-	5,0
Cardiology	45	1101	58	72,1	3,8	0,9	3,9
Nephrology	22	297	43	10,7	2,8	1,6	6,4
Neonatology	47	1167	1167	47,0	47,0	0,1	4,5
Neurosurgery	9	269	12	7,7	0,5	0,1	8,3
Neurology	48	1239	57	43,6	2,3	0,2	7,6
Ophthalmology	37	646	67	60,8	4,1	17,4	1,7
Oncology	25	862	81	47,8	2,7	52,6	4,4
Palliativecare	5	99	-	1,7	-	-	16,8
Otolaryngology	39	514	109	25,6	6,8	2,5	3,0
Pediatrics	30	860	860	38,6	38,6	0,5	4,2
Psychiatric	21	668	62	8,8	0,4	5,4	24,5
Rehabilitation	87	3379	584	41,5	7,9	0,0	22,7
Rheumatologic	10	363	20	11,3	0,7	-	7,5
Drugs, alcohol, etc. dependence	1	15	-	0,1	-	-	38,0
Toxicology	1	31	-	0,8	0,1	-	4,5
Transplantation	5	140	-	4,7	0,0	0,3	8,7
Urology	22	441	-	26,6	0,0	1,2	3,9

Source: prepared by author based on the dataHealth and health care in 2017. Statistics Poland. Warszawa, 2018.

In 2017, more than 158 thousand patients under 18 years of age were treated in the Silesian Voivodship that is 16% of the total of patients' number. The largest number of pediatric patients who were provided with inpatient treatment were patients from the neonatal and pediatric wards, as well as patients from the pediatric surgery department. Neonatology plays an important part in the modern healthcare system. Thus, in Poland in 2015 there were 3626 incubators for newborns, in 2016 their number decreased by 1,21%, and in 2017 it increased again and amounted to 3623. In 2015, the number of born babies amounted to 370906, in 2016 the year increased to 381268 or by 2,8%, and in 2017 the number of live-borns amounted to 396736 people, or 4% more compared to 2016.

In the Silesian Voivodship, the number of live-borns in 2016 amounted to 42743 people, or 11,2% of the total number of newborns in Poland. In 2017, there were 45040 live-borns in the Silesian Voivodship, that is 5,4% higher compared to the 2016 level. The number of incubators for newborns in the Silesian Voivodship in 2016 was 461 or 12,8% of the total number of incubators in the country, and in 2017 their number slightly decreased to 457 pieces. In 2015, the number of still-borns in Poland amounted to 1508

babies, in 2016 this indicator increased by 7%, and in 2017 by another 9%. The number of treated patients in various departments is closely correlated with the presence of a specialized bed capacity, the correlation coefficient between these two indicators is 0,8.

As can be seen from data table 5, the largest number of beds is represented in the departments of therapy and internal medicine (13%), in the departments of rehabilitation (13%), in the departments of general surgery (10%). The share of beds in gynecological and maternity wards is more than 7% of the total number of beds, the share of beds in orthopedics and traumatology is 6%. About 4-5% of the total number of beds is made up of beds in such departments as pulmonology, cardiology, neonatology, neurology. The remaining departments account for a significantly smaller number of beds.

Also in the departments, the number of patients to be admitted is planned in connection with the available bed capacity and the average time spent by the patient in a particular department. For example, in ophthalmology departments, the average patient's stay in the department is less than 2 days, the average patient's stay in such departments as: pediatric surgery, gynecology and the maternity ward, maxillofacial surgery, cardiology, otolaryngology, urology is from 2 to 4 days. At the same time, in such departments as: infectious diseases, pulmonology, intensive care, cardiac surgery, neurosurgery, the average patient's stay is from 7 to 10 days, and in some other departments, such as: palliative care, psychiatry, rehabilitation, narcotic and alcohol dependence, the average length of stay of the patient is more than 3 weeks, and sometimes more than a month.

Thus, the number of medical specialists both in the whole country and the particular Voivodship is determined by a number of factors, namely, the structure and characteristics of the population sickness rate, the demand for medical personnel, the available material and technical base of medical and preventive departments, some factors in the medical service market, the total number of medical graduates etc.

Table 6. Dynamics of various categories of medical personnel in Poland and in the Silesian Voivodship for 2016-2017

	Doctors	Dentists	Nurses	Midwives	Pharmacists	Laboratory diagnosticians	Emergency workers
Poland							
2016	144982	41194	288446	36839	33914	15563	13318
2017	146037	41281	291864	37694	34797	16051	14011
2016-2017,%	0,73	0,21	1,18	2,32	2,6	3,14	5,2
Silesian Voivodship							
2016	17490	4545	38042	4531	4189	1672	1444
2017	17796	4606	38313	4620	4291	1728	1480
2016-2017,%	1,75	1,34	0,71	1,96	2,43	3,35	2,49

Source: own elaboration based on the data Health and health care in 2017. Statistics Poland. Warszawa, 2018.

As can be seen from the data presented in table 6, for the period 2016-2017 there was an increase in all categories of medical personnel in Poland. Particularly high growth rates in the number of medical specialists were observed among medical rescuers (5,2%) and among medical laboratory assistants (3,14%), while the increase in doctors and dentists was less than 1%. Compared with country data for the period 2016-2017 lower growth rates of medical personnel in the Silesian Voivodship were observed among nurses (0,71%) and among medical rescuers (2,49%), while the growth rates

of doctors and dentists were significantly higher and amounted to 1,75% and 1,34% respectively. In 2017, the generalized structure of medical personnel in Poland was as follows: 25% of the total number were doctors, 7% were dentists, 50% were nurses, 6% were midwives, 6% were pharmacists, 3% were laboratory assistants and 2% - medical rescuers (paramedics).

In Fig. 1 shows the structure of the medical staff of the Silesian Voivodship for 2017.

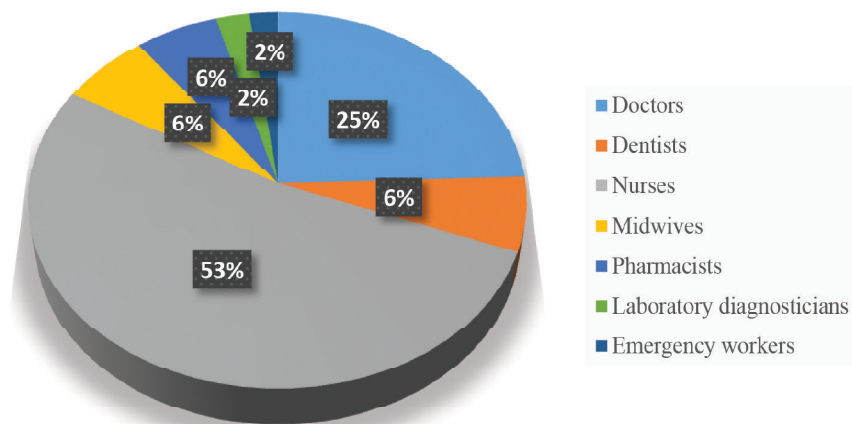


Fig. 1 Structure of the medical staff of the Silesian Voivodship for 2017 (%); Source: own elaboration

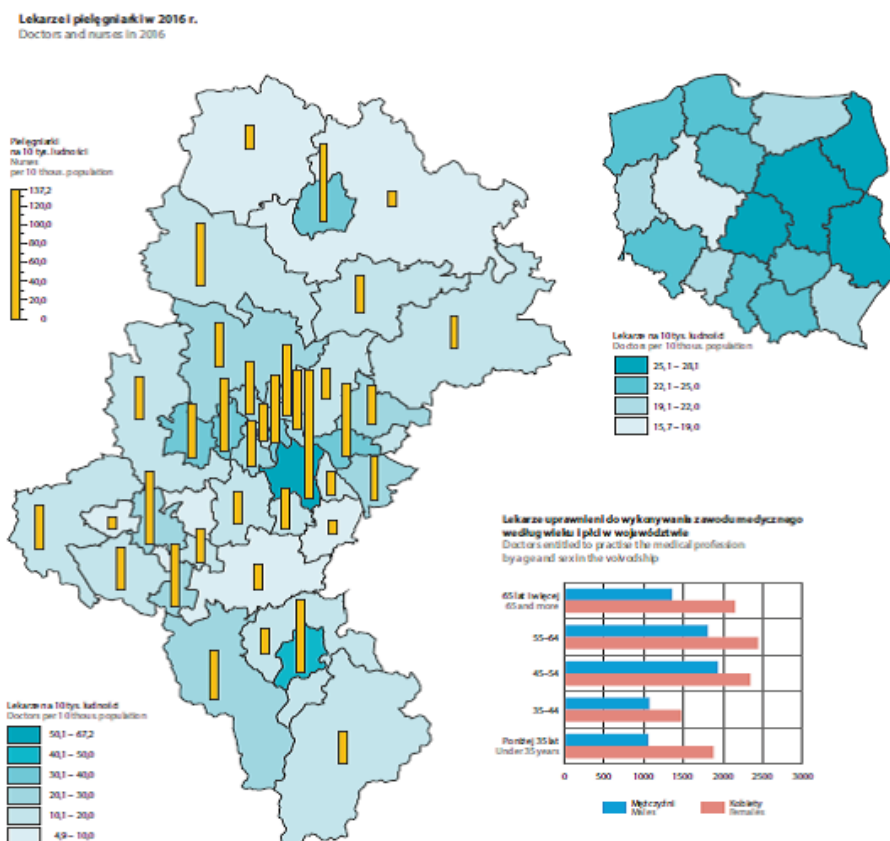


Fig. 2 Characteristics of the provision of medical personnel for the provinces of the Silesian Voivodship  
 Source: Statistical Atlas of the Silesian Voivodship

As can be seen from the presented figure, the structure of medical personnel in the Silesian Voivodship is somewhat different from the structure in Poland as a whole. Thus, nurses make up 53% of the total number of medical personnel, dentists - 6%, laboratory assistants - 2%, in other categories the indicators are almost the same as in the country as a whole. When conducting a strategic analysis and planning the medical specialists in the Silesian Voivodship, it is important to take into account the spatial distribution structure of medical personnel in separate administrative-territorial units - provinces.

Figure 2 shows the spatial distribution of medical personnel (doctors and nurses) in the Silesian Voivodship. Data are as of 2016. As can be seen from the presented cartogram, the largest number of doctors and nurses per capita was observed in the administrative center of the Silesian Voivodship - the city of Katowice, at the same time, in the cities neighboring Katowice, for example, in Sosnowiec, these indicators were also relatively high. In addition, there are relatively high indicators of the population provision with doctors and nurses in those areas where fairly large regional medical centers and specialized units of university clinics are located.

At the same time, the mobility of both medical personnel and patients is quite high in a radius of up to 50 km. Many medical specialists also work in medical institutions or in specialized units of university clinics located in other areas. Also, some patients from other regions of the Silesian Voivodship prefer to go to medical institutions located in Katowice or to specialized units of university clinics located in other cities of the Voivodship.

Among the various categories of medical personnel, doctors occupy an important place, therefore, in table 7, we present the structure of specialization of doctors in Poland and in the Silesian Voivodship in 2017.

Table 7. Structure of specialization of doctors in Poland and in the Silesian Voivodship in 2017

	Poland	Silesian voivodship	Silesian voivodship Proportion in Silesian voivodship, %	Share of specialists in Poland, %	Share of special- lists in Silesian voivodship, %
Total with grade II specialization and with specialists title	60123	7697	12,8	100%	100%
Anesthesiology and intensive therapy	3704	521	14,1	6,2	6,8
Surgery	8380	1120	13,4	13,9	14,6
Pulmonary diseases	1286	154	12	2,1	2
Internal diseases	6372	958	15	10,6	12,4
Dermatology and venereology	899	113	12,6	1,5	
Cardiology	2905	430	14,8	4,8	5,6
General Practitioners	6744	593	8,8	11,2	7,7
Occupational health care	815	133	16,3	1,4	1,7

Neurology	2406	332	13,8	4	4,3
Ophthalmology	2017	283	14	3,4	3,7
Oncology	740	82	11,1	1,2	1,1
Otolaryngology	1328	199	15	2,2	2,6
Paediatrics	3584	404	11,3	6	5,2
Obstetrics and gynaecology	3738	465	12,4	6,2	6
Psychiatry	2469	311	12,6	4,1	4
Radiodiagnos- tics	2277	327	14,4	3,8	4,2

Source: own elaboration based on the data Health and health care in 2017. Statistics Poland. Warszawa, 2018.

As can be seen from the calculations presented in table 7, in the Silesian Voivodship there is a variation in the proportion of the number of doctors with different specializations. Thus, general practitioners in the Silesian Voivodship make up only 8,8% of the total number of general practitioners with specialization in the country, but the concentration of doctors specializing in occupational diseases amounted to 16,3% of the total number of doctors with this specialization in the country. At the same time, the calculated structure of doctors with different specializations in Poland and in the Silesian Voivodship do not differ too much from each other. Therefore, in Poland as a whole, the share of doctors with specialization in "surgery" was 13,9% in 2017, and in the Silesian Voivodship – 14,6%; in Poland, in general, the share of doctors with specialization in internal medicine was 10,6%, and in the Silesian Voivodship – 12,4%; in Poland, in general, the share of doctors with specialization in "anesthesiology and intensive care" was 6,2%, and in the Silesian Voivodship – 6,8%. At the same time, the average figures for Poland and the Silesian Voivodship differ significantly for doctors with a specialization in general medicine. On average, in Poland this indicator was 11,2% in 2017, and in the Silesian Voivodship – 7,7%. For other specializations of doctors, the values of this indicator are close to the national average.

Thus, the analysis of indicators of the health care system functioning and the market for medical services in Poland and the Silesian Voivodship, a study of the health system provision as a whole throughout the country and separately by the example of the Silesian Voivodship made it possible to identify the characteristics of the external environment and its dynamics necessary for analyzing the strategic positions of the Silesian region health care system and the formation of human resources management strategies in this region.

## Conclusions

The healthcare sector is an example of a social infrastructure industry where human resources management plays an important role. Today, healthcare is a high-tech field where advanced achievements and results of applied research in microbiology, virology, biochemistry, and pharmacy are introduced and aimed at the diagnosis and treatment of complex diseases. At the same time, in addition to the high requirements for the level of training and qualification of doctors and medical personnel, continuous professional development and skills one should pay attention to medical organizations culture. The aim of that is to create a positive image of both the organization and its employees, professional communication with colleagues and patients, teamwork, leadership and development of the strategic potential of human resources in a medical organization.

Silesian Voivodship occupies significant positions in a number of segments related to medical services. This voivodship has rather a large potential of medical specialists due to the existence of the Silesian Medical University, higher medical schools and a number of universities that train medical staff in such specialties as a nurse, medical lifeguard, nutritionist, social worker, etc. At the same time, despite the increase in the number of students studying in medical specialties and graduates of medical universities and medical schools, in many medical organizations in Poland and, in particular, the Silesian Voivodship, there is a personnel shortage, especially among doctors of certain specialties, nurses, and midwives, etc. One of the reasons is the high labor migration of medical personnel from Poland to other EU countries, where wages are several times higher. There is also a significant outflow of medical specialists involved in academic work (teaching) and scientific research to other, more developed countries. In this regard, the problem of strategic human resources management in medical organizations in Poland is extremely urgent.

Thus, it is necessary to cover this lack of medical personnel in Poland due to special programmes of increasing wages and benefits from occupation in healthcare, to increase the capacities of higher educational institutions for the preparation of medical and healthcare students, to enlarge international cooperation in health sciences and research.

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# **STRUKTURA I DYNAMIKA PERSONELU MEDYCZNEGO W POLSCE I WOJEWÓDZTWIE ŚLĄSKIM: GŁÓWNE TEN- DENCJE I WYZWANIA**

## **ABSTRAKT**

Ochrona zdrowia jest ważnym obszarem infrastruktury społecznej, który ma swoją specyfikę. W ostatnich latach opieka zdrowotna aktywnie się rozwija, wykorzystując nowe osiągnięcia w dziedzinie technologii biomedycznej i farmacji. Pomimo poważnych osiągnięć w zakresie reformy opieki zdrowotnej w Polsce w ostatnich dziesięcioleciach istnieją poważne problemy oraz różnice w rozmieszczeniu personelu medycznego w kraju i niektórych regionach. Celem artykułu było dostosowanie znaczenia zarządzania strategicznego i zarządzania zasobami ludzkimi w opiece zdrowotnej, badanie cech rynku pracy w zakresie opieki zdrowotnej w województwie śląskim oraz porównanie z ogólną sytuacją w Polsce. Analiza struktury i dynamiki personelu medycznego w województwie śląskim z uwzględnieniem głównych tendencji i wyzwań w ochronie zdrowia. Na podstawie analizy oceniono pozycję województwa śląskiego pod względem struktury i dynamiki personelu medycznego oraz zaproponowano rekomendacje.

## **SŁOWA KLUCZOWE**

opieka zdrowotna, główne wskaźniki, personel, analiza, tendencja