

Quantitative analyses in the evaluation of the competences of healthcare providers in Poland – experiences from healthcare needs maps¹

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Received: 10 May 2018; Accepted: 11 December 2018; Published: 21 December 2018

Abstract. The purpose of the article is to identify methods of measuring competences and competence gaps of healthcare providers. In this context, competence is defined as the ability of an organisation (business) to combine expert knowledge and resources in a way that enables achievement of strategic objectives. Competence gaps can be identified based on healthcare needs maps – a strategic government document based mostly on public payer data. The main part of the article concentrates on practical examples of using publicly available data in order to identify, quantify and assess competence related gaps. The recommendations for healthcare policymakers to address the identified gaps are also provided.

Keywords: evidence based management in healthcare system, healthcare needs maps, competences of healthcare providers.

JEL Codes: I18.

1. Introduction

There is no doubt that in the current economic situation human capital is the main resource of businesses and institutions, and consequently of the entire economy. The characteristic that determines the value of human capital are its competences, defined as the scope of one's knowledge, skills, and experience [sjp.pl, n.d.]. Publications on this topic contain many definitions and classifications of the term

¹ The article was prepared as one of the results of the project: „Sektorowa Rada ds. Kompetencji – Opieka Zdrowotna i Pomoc Społeczna” prepared by the team of Pracodawcy RP and Federacja Związków Pracodawców Ochrony Zdrowia Porozumienie Zielonogórskie, Uczelnia Łazarskiego and Wyższa Szkoła Pedagogiczna im. J. Korczaka.

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“competence”. A specific study of publications on this topic is presented by Kęsy [2013]. Regardless of the adopted definition, it must be concluded that they not only are a tool that enables gaining competitive advantage, but are actually necessary in order to achieve the assumed objectives (both economic and social). The meaning of the term “medical competences” is sometimes considered also in the context of patients (cf. [Hartman 2011]), and an empowerment of patients in the medical process has become an inseparable topic of every debate about healthcare.

However, one must also ask the question of whether it is not necessary to study the competences of healthcare organisations (especially healthcare providers) as subjects of the state’s healthcare policy, which, by using internal mechanisms, may affect both medical professionals and patients. The main cause of such an approach is the need to find solutions aimed at increasing (or, in some cases, only maintaining) effectiveness of the healthcare system given the raising level of health needs, while ensuring the safety of patients.

The purpose of this article is to present a possible scope of conclusions related to the current competences of healthcare providers based on such documents as healthcare needs maps. The results of the work may be useful to both healthcare providers, in order to update their strategies, and decision-makers in the healthcare system, to make changes to the current healthcare policy. In the first part of the document, starting with the term of „organisational competencies”, a definition is provided of the term of „competences of medical institutions”, indicating those properties resulting from the adopted strategies that make them different from other enterprises, using the subjective and objective report in relation to other types of competences. Then the concept of healthcare needs maps, a tool that enables an indirect analysis of competences, was presented. Further parts of the document focus on an analysis of gaps related to the competences of healthcare institutions that can be identified using healthcare needs maps.

2. Competences of healthcare institutions - definition of a problem

The identification of competences of healthcare institutions requires the definition of the term “organisational competencies”. The meaning of this term includes the ability of an organisation (business) to combine expert knowledge and resources in a way that enables achievement of strategic objectives. Particularly important are core competences which “specify and support the development of outstanding abilities, processes, and resources, while weakening the importance of actions that do not produce any added value” [Bratnicki 2000, p. 14]. Core competences enable organisations to build their competitive advantage.³ There is a feedback between competences and the strategy of an organisation: “*an important role in the process*

³ In addition to the concept of core competences as a source of competitive advantage of an organisation, they indicate time-based competition, competition based on outstanding capacities of the business, and the concept of E. Porter [Wieczorek-Szymańska 2012, p. 409].

of formation of a strategy is currently played by core organisational competencies, contained in intangible resources of the business” [Siwak 2015, p. 34].⁴

Organisational competencies are the product of integration and coordination of individual competencies and result from a combination of knowledge, skills, and advantages of employees, but also are something more than a simple sum of competencies of individuals [Lendzion, Stankiewicz-Mróż 2005, p. 91]. Moreover, organisational competencies are created by combining multiple elements: individual competencies, hard organisational factors (e.g. equipment), and soft, intangible factors (e.g. business culture).

In the healthcare system, competencies are even more important because the acquired “product” is (most often) an inalienable and irreversible service and pertains to the highest human values: life and health. Even though the literature on the definition and measurement of the competencies of employees of the healthcare system (mostly medical) is (rather) rich [Epstein, Hundert 2002; Health Professions Education: A Bridge to Quality, 2003; Core Competencies for Public Health in Canada: Release 1.0 2007; Larkin, Klonoff 2014], studies in the area of organisational competencies in the healthcare sector are not so popular.⁵ Competencies of healthcare institutions should be analysed through the lens of the most important product they deliver, namely healthcare services, and the ability to provide them by, using their knowledge, experience, and skills, “provide additional benefits to customers” and, consequently, built competitive advantage in the healthcare sector. Customers of healthcare institutions are not only patients but also their families involved in the treatment process, and the benefits are restored/maintained health using effective and safe healthcare services of high quality.

It is also worth mentioning not only the need to support competencies but also the necessity to develop new ones that address the requirements of the “customers” and the need of identification and evaluation of the competence gap and the selection of the way to reduce it, frequently emphasised in publications on this topic [Sitko-Lutek, Pawłowska 2011, p. 49]. The healthcare needs maps tool presented below appears to be appropriate not only for identification but also for benchmarking of competence gaps of healthcare institutions in Poland.

3. Healthcare needs maps - the process of implementation of the tool

Healthcare needs maps were introduced in their current form in the Polish healthcare system in 2015.⁶ Their objective is to support the decision-making process

⁴ A comprehensive concept of core organisational competencies was proposed by Coimbatore Krishnarao Prahalad and Gary Hamel in 1990 [Pralhad, Hamel 1990].

⁵ Even publications titled “Measuring the Competence of Healthcare Providers” study the problem from the point of view of competencies of individuals employed in organisations, as opposed to broadly defined organisations [Kak, Burkhalter, Cooper 2001].

⁶ It was provided for in the Act of 22 July 2014 on amending the Act on healthcare services financed with public funds and certain other acts [Journal of Laws of 2014, item 1138]. Healthcare needs maps are the subject matter of a separate section: Section IVa “Evaluation of health needs.”

in the healthcare system by publishing the relevant indicators and forecasts [Więckowska 2017].⁷

In principle, regional healthcare needs maps are prepared, in 5-year cycles, by province governors, with the support of Provincial Councils for Healthcare Needs Maps, based on map designs (based on uniform methods of analysis and homogeneous data sources for all provinces) provided by the National Institute of Public Health - National Institute of Hygiene (hereinafter referred to as NIPH-NIH). After receiving provincial healthcare needs maps, the NIPH-NIH prepares a design of a nation-wide map and presents all documents for acceptance by the minister of health. Approved maps are published on the Public Information Bulletin website of the office supporting the minister competent for healthcare matters and offices supporting province marshals.⁸

This is how the Act defines the target mode of the creation of healthcare needs maps. However, in the transition period covering the first two editions of the maps⁹, the decision was made that the maps would be prepared by the minister competent for matters related to health. This decision was due to the possibility to access information that is in the possession of the payer and information gathered in registers (including medical register) and to the intent to prepare uniform templates of indicators used in the process of reaching conclusions concerning the healthcare system in Poland. At the same time, the range of topics of the first healthcare needs maps was reduced to the area of hospital healthcare, because it was found that only in this area there is complete and reliable data available for the purpose of analysis [Więckowska 2017].

In addition to the process defined by the Act, due to the so-called *ex ante* conditionality imposed by the European Commission, actions were performed in order to speed up the implementation of a new instrument [National strategic framework..., 2015]. Thanks to European funds, the Department of Analyses and Strategy of the Ministry of Health completed the project titled “Improvement of the quality of management in healthcare by supporting the process of creation of regional healthcare maps as a tool improving the management processes in the healthcare system - training on the estimation of healthcare needs.” The product has resulted in the creation of the first healthcare needs maps: (1) for cancer (solid tumours); (2) for heart diseases [Więckowska 2017].

The next step was the implementation of statutory provisions, i.e. publication of the so-called hospital maps in which an analysis was performed for individual

⁷ Each map consists of two main elements: (1) demographic and epidemiological analysis; (2) analysis of the condition and use of resources; (3) health needs forecasts. The scope of the contents of healthcare needs maps is governed by the provisions of the Regulation of the Minister of Health of 26 March 2015 on the scope of the contents of healthcare needs maps (Journal of Laws of 2015, item 458). (More information about the range of topics of healthcare needs maps can be found in [Więckowska 2018]).

⁸ Also, a mechanism of annual update/monitoring of the results of the maps is implemented.

⁹ This applies to maps published until 1 April 2016 (in force in the period starting on 30 June 2016 and ending on 31 December 2018) and maps published until 31 May 2018 (in force in the period starting on 1 January 2019 and ending on 31 December 2021).

hospital wards. The maps were published in April 2016. Then, by implementing the provisions of the partnership agreement, the Ministry prepared healthcare needs maps for the remaining 30 groups (December 2017).¹⁰ The update of the hospital maps in May 2018 gave the process its final shape.¹¹

4. Competence gaps of healthcare institutions

Based on the documents prepared by the Ministry of Health, the following three competence gap areas were identified that were applicable to healthcare institutions in Poland:

- different abilities to use available diagnostic and treatment tools;
- inadequate frequency of provision of services that are important from the point of view of patient safety;
- inadequate use of competencies of employees on different levels of the organisation in the healthcare system and between different specialities.

Moreover, the following two competence-related factors seem worth discussing:

- insufficient or uneven (current and forecast) saturation with medical staff;
- uneven distribution of patients clinical condition.

In the remaining part of this article, the above thesis will be elaborated in detail and illustrated with various examples.

5. The gap in the different abilities to use available diagnostic and treatment tools

Even though equal access to healthcare services in Poland is assumed¹², there are frequent and significant differences in the health and access to preventive actions and health promotion. An example of such a difference is demonstrated by an analysis of the incidence of chronic diseases, in particular, those for which screening is provided.

¹⁰ Divided into 2 modules, defined in order to differentiate the dates of preparation of the documents: Group A comprises the following disease groups: (1) diseases of the musculoskeletal system; (2) diseases of the nervous system (neurological old-age diseases); (3) diseases of the nervous system (other diseases); (4) diseases of the cardiovascular system; (5) diseases of the respiratory system (chronic); (6) diseases of the respiratory system (acute); (7) diseases of the endocrine glands; (8) childhood diseases; (9) mental diseases; (10) pregnancy, delivery, puerperium; (11) diabetes; (12) hematology (cancers); (13) hematology (other); (14) benign tumors; (15) congenital disorders. Group B comprises the following disease groups: (1) metabolic diseases; (2) diseases of the eye and adnexa; (3) diseases of the skin; (4) venereal diseases in men; (5) venereal diseases in women; (6) diseases of the urinary system; (7) diseases of the digestive system (liver and pancreas); (8) diseases of the digestive system (upper part without the liver and the pancreas); (9) diseases of the digestive system (lower part); (10) diseases of the ear and mastoid process; (11) infectious diseases (viral hepatitis); (12) infectious diseases (HIV); (13) infectious diseases (other); (14) stomatology; (15) injuries (fractures, poisoning, etc.).

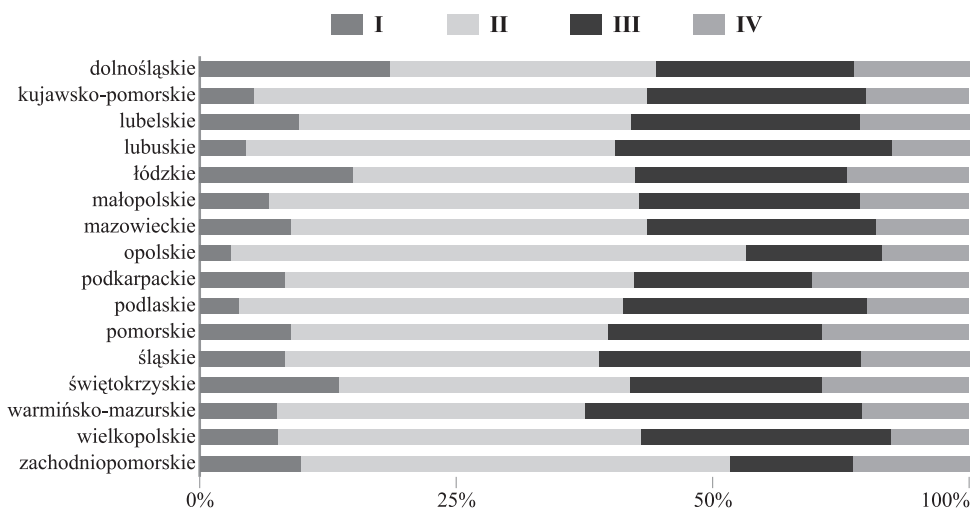
¹¹ All results of the works can be found at www.mpz.mz.gov.pl.

¹² This is expressed in the provisions of the Constitution (Art. 68).

The first part of a healthcare needs map comprises a demographic and epidemiological analysis. Because studies of incidence and morbidity in Poland are not conducted regularly, the documents contain references to registered incidence and morbidity. The objective was to determine indicators that are not estimated based on epidemiological studies but based on information on discharged patients. When analysing the database of the public payer for the period 2010-2012 (or, depending on the map, the period 2010-2014), the first occurrence of a patient was determined in the system reported, with the diagnosis¹³. Based on that, the registered incidence was estimated for a given year. On the other hand, all living patients, regardless of whether they received any services in a given year in the public payer system, were included in the morbidity determined at a given time [Więckowska 2018].

Whenever it was possible to confront the database of the public payer with a medical register, the quality of the estimates was improved. Such actions were taken among others in relation to cancers - solid tumours [Więckowska et al. 2015].

Figure 1. The structure of the stages in the incidence of breast cancer by province, 2012



Source: Authors' elaboration based on the healthcare needs map for oncology, www.mpz.mz.gov.pl

The results indicate large differences in detection of cases of cancer in Poland. For example, in the case of breast cancer, there are significant differences in the share of the first stage among newly diagnosed patients: in the Lower Silesian Province,

¹³ Specifically, the diagnosis according to the International Classification of Diseases ICD-10, included in a given sub-group of diagnoses separated based on the knowledge of medical experts. Sometimes an additional condition was established, e.g. a patient with a given diagnosis had to appear one more time (or several times) in the system, so as to provide an additional verification of correct diagnosis instead of system up-coding.

patients in this stage constitute 25% (the highest value in Poland), while in the Podlaskie and Opolskie Province, the share of the second stage is clearly visible. In the Podlaskie Province, the share of the first and second stage is among the lowest in the entire country (52%, 4th place in Poland).

For this reason, it is necessary to either improve access to screening or verify the skills of the medical staff related to early detection of cancer in provinces with the worst structure of diagnoses in the different stages. Similar analyses must be performed for other groups of diagnoses related to solid tumours, as well as incidence and morbidity per 100,000 of persons in the case of other diseases. However, in the latter case, if there are no medical registers related to specific diseases, expert knowledge must be used to determine possible up-coding, especially in the identification of existing differences between reporting practices in various provinces.¹⁴

6. The gap in the frequency of provision of services that are important from the point of view of patient's safety

Despite the fact that there are no differences in rights to medical services provided by specialists in different fields in Poland, the first-hand experience gained in medical centres can have a significant impact on the risk faced by patients after operations. The healthcare needs maps studied the relationship between performance of a specific number of services in a medical centre and the post-operative mortality¹⁵ among patients. Of course, an analysis of such problems without considering the level of complication of specific patients would lead to significant errors; consequently, an appropriate standardisation was implemented in healthcare needs maps.¹⁶

A negative correlation between the mortality rate and the number of treated patients was confirmed both in the case of radical surgery of solid tumours (in this case, in many diagnoses, an important boundary was the ratio of 60 procedures per centre; see Figure 2) and in the case of surgeries of peripheral vessels in treatment of atherosclerosis (Figure 3), and the number of large and complex operations on Diagnosis Related Groups in the F group (where in the case of fewer than 1,200 operations a year, the mortality rate is nearly 2 times higher: 4.4 vs. 2.6; see Figure 4).

The quality of the services provided is not only approximated by the number of hospital deaths, but also by such events as complications (or lack thereof). An example of such analysis is a comparison of the number of births in a given

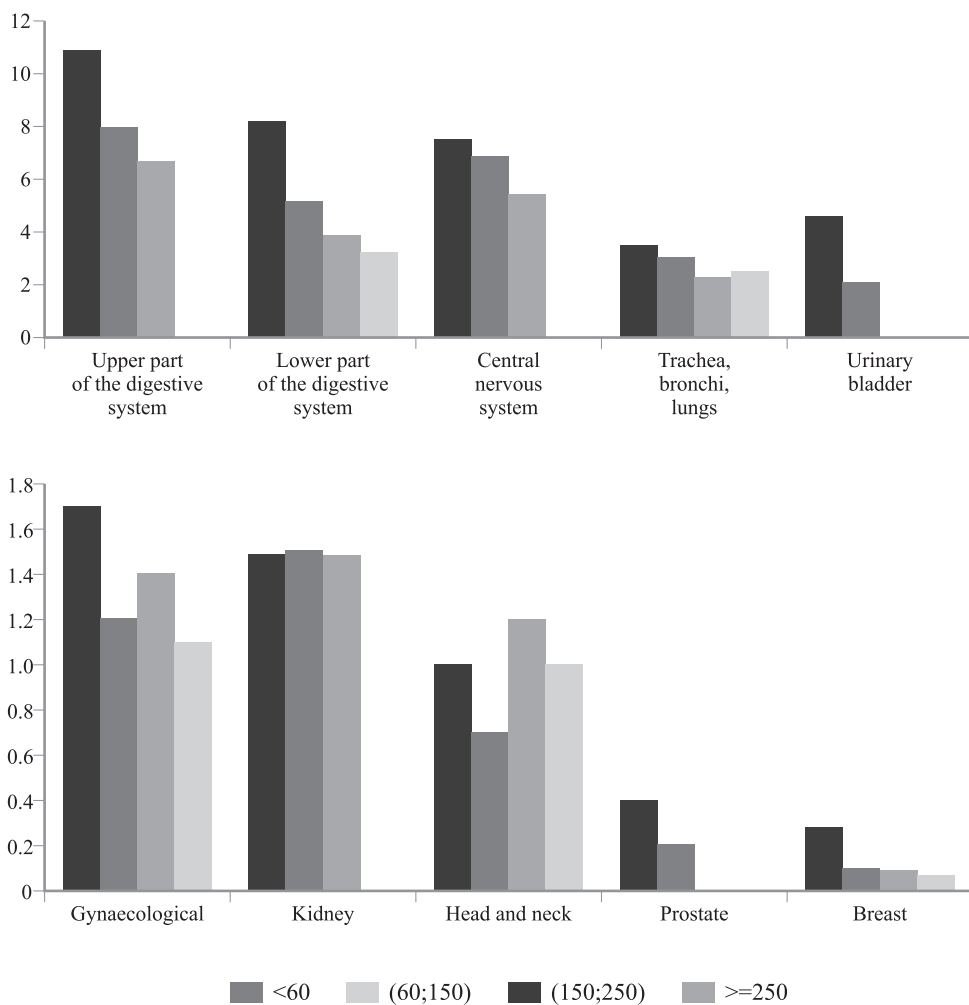
¹⁴ If up-coding is the same in the entire Poland, it will influence the absolute values of indicators but will not influence the relational values, e.g. per 100,000 people, which will enable regional comparisons and inference. On the other hand, if the practices in different provinces are different, the result of such analysis may be incorrect.

¹⁵ Post-operative mortality is defined as the share of patients who died before being dismissed from a hospital or within 30 days after the procedure.

¹⁶ Standardisation was performed in relation to the stage of the cancer and to demographic factors (age, sex), or in relation to occurrence of other diseases (Charlson ratio; more information can be found further in the article).

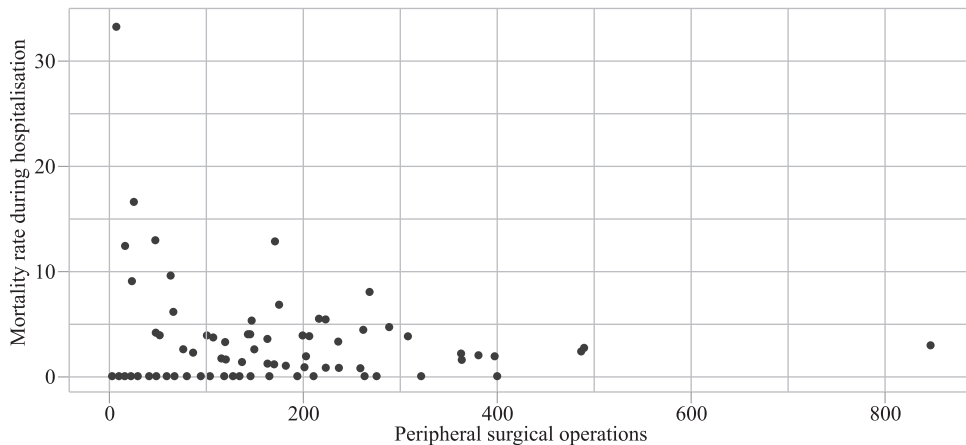
centre with the ratio of vaginal deliveries (properly weighed by risk) which has led to the conclusion that there is a significant impact of the number of births in a given centre on the value of that ratio.

Figure 2. Standardised mortality rates in selected groups of cancers depending on an average yearly number of radical surgeries in a given group performed by the healthcare provided in Poland, 2012



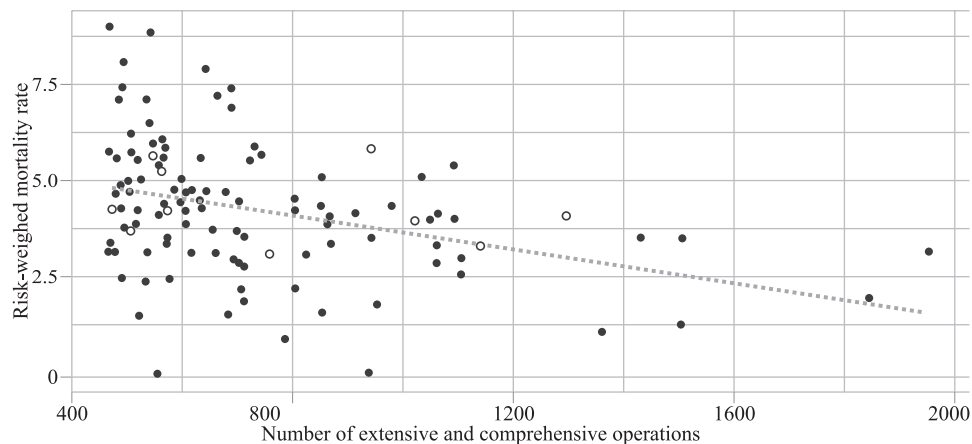
Source: [Więckowska, Czerwiński 2015].

Figure 3. Mortality rate in peripheral vessel surgeries in the treatment of atherosclerosis in Poland, 2014



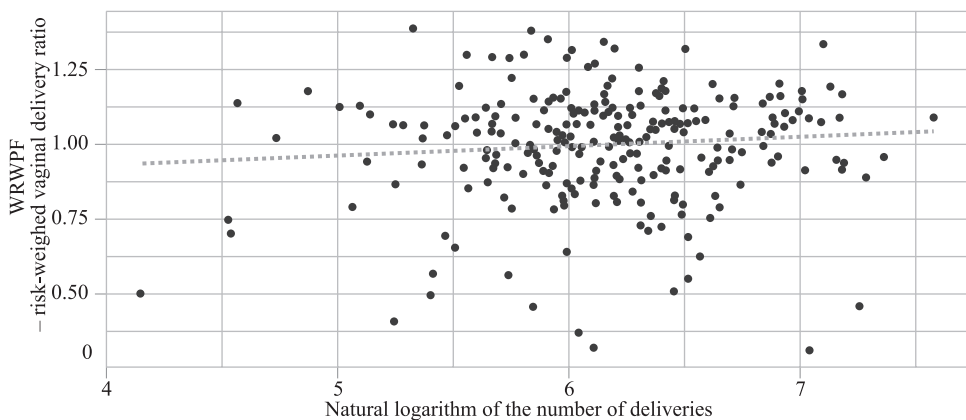
Source: Health needs map for diseases of the aorta and peripheral vessels, taking into account hypertension, www.mpz.mz.gov.pl

Figure 4. Risk-weighted hospital mortality rate for large and comprehensive operations in the Diagnosis Related Group F (operations of the digestive tract) according to hospitals, 2014



Source: Hospital healthcare needs map for the Kujawsko-Pomorskie Province, www.mpz.mz.gov.pl

Figure 5. The relationship between the natural logarithm of the number of births in a hospital and the risk-weighted ratio of vaginal deliveries in hospitals in Poland - 1st reference level, 2014



Source: Healthcare needs map for pregnancy, delivery, and puerperium, and neonatal care for the Lower Silesian Province, www.mpz.mz.gov.pl

The necessary conclusion from the above examples is that the number of healthcare providers for specific types should be limited or even that reference centres should be indicated. Such actions were initiated in healthcare needs maps where, in the case of solid tumours, the maximum number of centres was indicated that should perform radical surgeries so that each of them can perform the minimum number of operations (while ensuring the possibility for patients to choose their healthcare institution).

Similar actions were performed in hospital maps where the capabilities were analysed. For example, in the case of the aforementioned Kujawsko-Pomorskie Province, the map indicated that none of the 42 healthcare providers in that province that conduct large and comprehensive operations of the digestive tract performs more than 1,200 operations, while, considering the number of the operations done, there is room for at most 8 hospitals in this specialisation.

The aforementioned solution should also include places where the existence of a centre would be desirable due to its geographic location (access to another centre limited or impossible in a specific period of time). In such a case, it would be advisable to strive to promote actions intended to increase the frequency of performance of operations by doctors working in small centres, e.g. by introducing additional periodic practical training or periodic exchange of personnel between different centres (e.g. using the so-called satellite centres). This solution was included in the map related to pregnancy, delivery and puerperium, where the forecast indicating the necessary healthcare providers included not only the forecast number of deliveries exceeding 400, but also, due to the significant share of urgent conditions, the distance from the nearest centre not exceeding 40 km.

What needs to be reemphasised is the fact that the aforementioned actions would be due to concern for the safety of patients and not to the economic results of the healthcare institutions (profitability of some healthcare services or lack thereof).

7. The gap in the use of competencies of the medical personnel

An analysis of the gap in the use of competencies of medical personnel in Poland's healthcare system can be performed vertically and horizontally. A vertical analysis refers to the lack of performance of specific diagnostic and treatment procedures on lower organisational levels of the system, resulting in their performance on higher levels. This leads not only to a lower economic efficiency of the system, but also, if the personnel resources are insufficient, to a significant reduction of access to more advanced treatment by those in need.

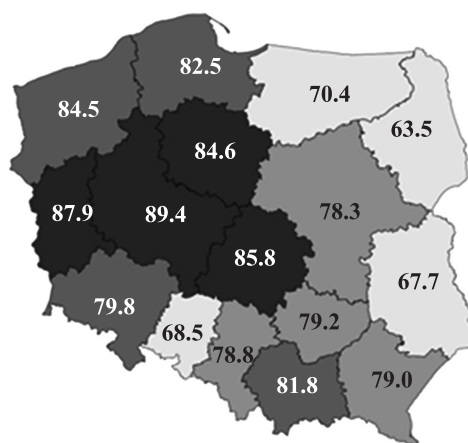
It is frequently stated that the burden on hospitals should be reduced by directing a part of the patient stream to specialist outpatient care or to palliative and hospice care, or long-term care, while reducing the burden on the specialist outpatient care by primary healthcare. However, it is difficult to translate such general statements into operational actions. The analyses performed in healthcare needs maps provide the basis for the determination of specific actions that should be performed in order to achieve that objective. Moreover, the published data will constitute a valuable reference point in its achievement.

Examples of such areas are asthma and benign prostatic hyperplasia. Out of the 2.1 million visits reported in 2014 that were due to asthma in specialist outpatient care institutions (mostly in lung diseases and allergology clinics), in approx. 69% of the visits, the patients visited the respective clinic at least three times during the year. Additionally, approx. 53% of the visits were reported as W11, meaning medical consultations (given to a patient with a diagnosed disease), without any additional procedures or examinations. In the case of specialist outpatient care reported with a diagnosis of a benign prostatic hyperplasia, out of 1.6 million consultations, approximately 660 thousand were medical consultations without additional procedures (W11) and 495 thousand were consultations that included basic diagnostic procedures (W12). This is why support should be provided to actions that are intended to move care for patients with benign or well-controlled asthma and benign prostate hyperplasia to the primary care level.

On the other hand, an example of an area that requires reinforcement of healthcare services provided by specialist outpatient care and reduction of the burden on hospitals is care for patients with rheumatic diseases. In the case of diseases included in the scope of rheumatology, it can be concluded that approx. 80% of all reported hospitalisations constitute inflammatory diseases, a group indicated by medical consultants as the target group in their specialisation, while the remaining 20% refers to the so-called non-inflammatory diseases. However, an analysis of the reported data on the province or hospital level leads to the conclusion that the share of hospitalisation with diagnosed inflammatory disease varies in different provinces (from 63.5%

to 89.4%; see Figure 6). Moreover, there are hospitals where the share of hospitalisation due to non-inflammatory diseases exceeds 50% (11 out of 87 hospitals reporting on their healthcare services in the scope of rheumatology). Consequently, it is necessary to strive to free up the ability to provide hospital healthcare services by moving the largest possible number to outpatient care, especially patients suffering from non-inflammatory diseases. This may contribute to an increased effectiveness, both economic (reduction of a unit cost of treatment) and clinical, by optimum use of the competencies of the personnel (possibility to increase the number of visits per patients, with resulting fuller supervision over the treatment process).

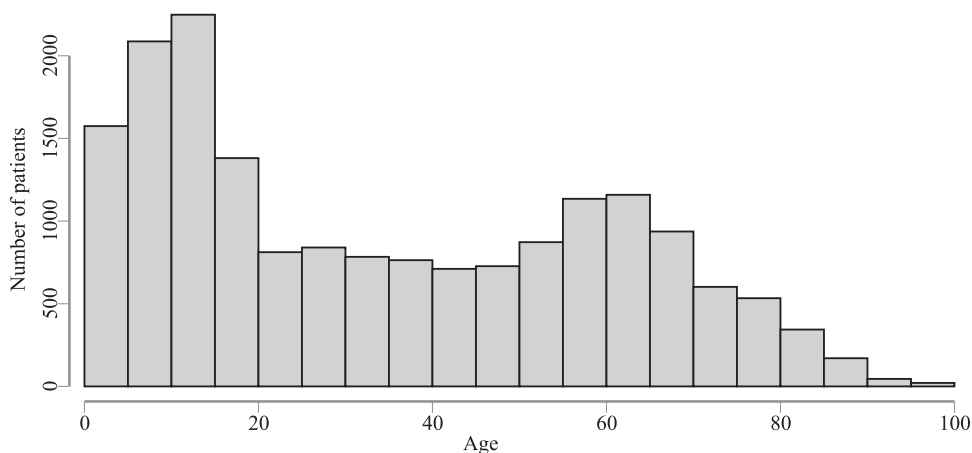
Figure 6. Share of hospitalisations of inflammatory diseases in the scope of rheumatology by province, 2014



Source: Authors' elaboration based on the healthcare needs map for musculoskeletal diseases, www.mpz.mz.gov.pl

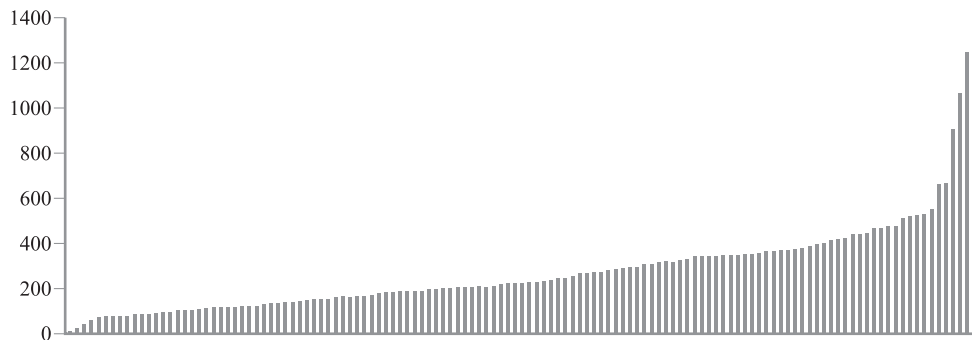
Horizontal analysis of gaps in the use of competencies refers to cooperation between different specialities on the same organisational level of the healthcare system. One of the main problems in Poland is the transition of patients with chronic diseases from care provided by childhood disease specialists (when patients grow up) to care provided by specialist physicians. An empirical articulation of this proposition is an analysis of the distribution of the structure of hospitalisation by age due to diseases of endocrine glands (approx. 1.4 million patients in 2014). The data indicates a significant decrease in the number of patients who are between 18 and 20 years old: 1.75 thousand persons aged 18 and 1.18 thousand (30% less) of patients aged 20 (especially in the case of diseases of the thyroid, diseases of parathyroid glands, and obesity; see Figure 7), which confirms observations of practitioners that access to healthcare services in the so-called transition period is limited. This is why it is extremely important to develop a system for “handing over” of patients between “adult” and “child” specialists.

Figure 7. Distribution of the number of hospitalised patients by age group, 2014



Source: Authors' elaboration based on the healthcare needs map for diseases of endocrine glands, www.mpz.mz.gov.pl

Figure 8. Total number of hospitalisations related to pneumonia, bronchitis, or exacerbation of chronic obstructive pulmonary disease by hospital, 2014



Source: Authors' elaboration based on the healthcare needs map for diseases of the respiratory system, www.mpz.mz.gov.pl

Based on the analysis of the data contained in healthcare needs maps, similar recommendations can be given to internal medicine wards: it is necessary to strive to increase the rate of hospitalisation in those wards in order to reduce the burden on specialist wards, while moving a part of the patients from internal medicine wards to palliative and hospice care or long-term care. For example, in 2014, in haematology wards, there were about 3 thousand hospitalisations only for the purpose of blood transfusion (without administering an active substance or other procedures). Such hospitalisations could have taken place at internal medicine wards, thus reducing the burden

on haematology wards. The situation was similar in the case of hospitalisations due to pneumonia, bronchitis, or exacerbation of chronic obstructive pulmonary disease in pulmonology wards. In some pulmonology wards those numbers exceed 400 a year (see Figure 8). By moving some hospitalisations to internal medicine wards, it would be possible to reduce the burden on specialist wards.

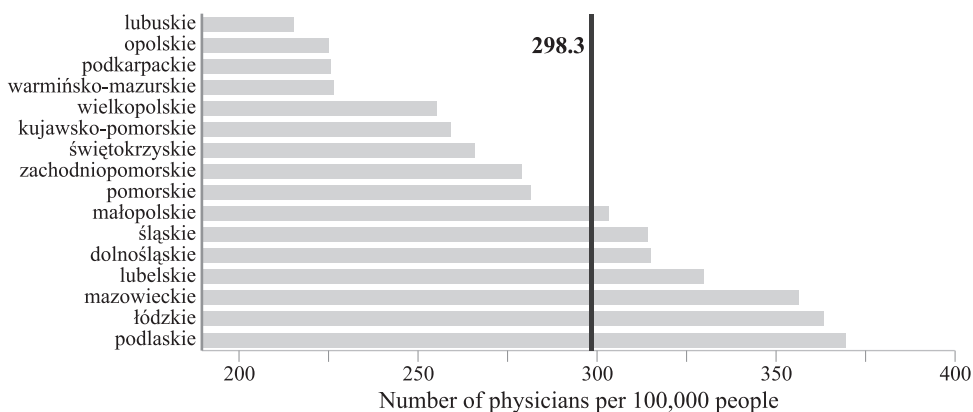
8. The competence gap related factors

When one is analysing the data in order to identify, quantify and assess competences gaps potential causes of these gaps have to be taken into account. Based on healthcare needs maps two competence gaps related factors can be identified: (1) insufficient/uneven saturation with medical personnel, (2) uneven distribution of patients' clinical condition.

8.1 Insufficient/uneven saturation with medical personnel

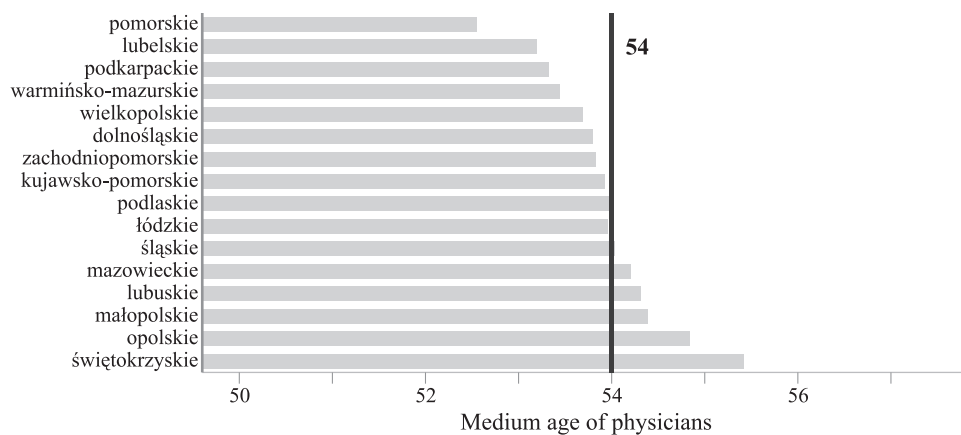
The first competence gap related factor, which can be identified thanks to healthcare needs maps, refers to the core resource of healthcare institutions and is due to the different saturation of medical personnel in various provinces. An analysis of the data presented in the maps demonstrates disparities in the number of physicians per 100 thousand people and differences in the average age of physicians (Figures 9-10). The situation is completely different in diverse provinces. For example, the Opolskie Province has the second smallest number of physicians per 100 thousand people and the second highest median age of physicians, while the Łódzkie Province and the Podlaskie Province are in a much better (relatively speaking) situation because of the highest number of physicians per 100,000 people and the average median age of physicians compared to other provinces in Poland.

Figure 9. Number of physicians per 100,000 people by provinces, 2014



Source: Authors' elaboration based on the healthcare needs map for hospital care, www.mpz.mz.gov.pl

Figure 10. Medium age of physicians by provinces, 2014



Source: Authors' elaboration based on the healthcare needs map for hospital care, www.mpz.mz.gov.pl

A future challenge with regard to personnel will be to adapt competencies to the characteristics of patients, especially demographic aspects and co-existing diseases. The average age of the patient is different depending on the ward; for example, in general surgery wards it is 57, while in internal medicine wards it is 68 (Table 2). The nominal age of patients determines not only the range of diagnostic and therapeutic options, but also the set of required competencies that enable effective communication with patients, especially with regard to indication of behaviour recommended after hospitalisation.

8.2 Uneven distribution of patients' clinical condition

Another important element is a varied clinical condition of patients, especially in the case of elderly persons who frequently suffer from other diseases, often chronic, coexisting with the main disease that is treated or who had previous medical episodes that have a significant impact on the prognosis. In healthcare needs maps, the degree of "clinical complication" of a patient is estimated using an approach based on the 1987 publication by Mary E. Charlson.¹⁷

Based on an analysis of the available data, it can be concluded that the values significantly vary with regard to different types of wards (e.g. in the case of general surgery wards, the percentage of patients with the lowest value of the ratio was 71%,

¹⁷ In this approach, 17 groups of diseases were identified and then each of them was assigned a certain weight determined on the basis of an analysis of the survival rate. The value of the ratio of co-existing diseases for different patients is the sum of the weights of the disease groups that were identified in the patients' records. Due to the multiple variations of the approach recommended by Charlson, in healthcare needs maps, an analysis was performed that replicated the selected approaches, a different method of grouping of diseases was developed, and different weights were calculated. The structure of patients according to the ratio of coexisting diseases was presented for each hospital ward.

while in the case of internal medicine ward, it was equal to 41%¹⁸; see Table 2) and for wards of the same type (which may indirectly indicate reference levels, even though often they are not defined formally).

The issue of coexisting diseases is particularly important in the case of elderly patients; consequently, one should expect an increasing demand for geriatric care which, given the number of physicians specialising in geriatrics, may lead to a significant gap in access to competencies of gerontologists, and for developing tools for communication/collaboration between specialists (e.g. interactions of drugs). In order to determine the scale of this gap, it is necessary to conduct the analysis that was announced in the provincial summaries concerning the maps for 30 disease groups: “(...) in the next stage of the analysis, it would be advisable to perform an in-depth analysis of co-existing diseases in elderly patients and to determine the percentage of patients over the age of 80 who, in the course of hospitalisation, received the following care: *Comprehensive Geriatrics Evaluation (CGE)*”.

Table 2. Age structure and co-existing diseases in selected wards

Ward	medium age	Value of the ratio of co-existing diseases			
		0	<1.2>	<3.4>	5+
General surgery	57	71%	14%	12%	4%
Internal medicine	68	41%	34%	17%	9%
Neurology	58	42%	39%	12%	6%
Pulmonary diseases	63	52%	15%	24%	9%
Urology	61	55%	9%	28%	8%

Source: Authors' elaboration based on the healthcare needs map for hospital care, www.mpz.mz.gov.pl

9. Conclusions

Like in other sectors of the economy, in healthcare organisations competencies are a key factor of competitive advantage, organisational effectiveness, and quality of services. Consequently, measurement of competencies and existing competency gaps is a very important matter. Moreover, it can be used to create an early warning system: a drop of the level of competencies, on the micro level, is an indication of possible loss of competitive advantage and, on the macro level, is an indication of a possible reduction of sector's effectiveness.

¹⁸ As the healthcare needs maps indicate, in the year prior to the analysed hospitalisations, patients with the ratio of coexisting diseases equal to 0 were not hospitalised due to diseases of the highest mortality rate and to chronic diseases that significantly increase the risk of death. This means that such patients did not suffer from any of those diseases. However, it is assumed that no hospitalisation indicates a form of a given disease that is not serious enough to have a significant impact on the probability of death.

Given the limited systemic tools that enable ongoing measurement of organisational competencies in a direct manner, it is necessary to find other sources of information that would enable their indirect analysis. Healthcare needs maps are a possible source of such information. They make it possible not only to identify some gaps in competencies but also to define their initial measures that will constitute a benchmark in the evaluation of the actions taken, but may also constitute a valuable indication of the actions that must be intensified.

An analysis of the information they provide enables identification of a number of areas related to shortages of competencies in healthcare institutions. The most important gaps are: (1) the gap in the ability to use the available diagnostic and treatment tools that takes the form of, e.g. different structure of the stage of cancer at the time of diagnosis in different provinces; (2) the gap in the frequency of provision of services that are important from the point of view of patient's safety, which is related to the so-called learning curve; (3) the gap in use of competencies, which is manifested by improper organisation of healthcare services on different levels (primary care, specialist outpatient care, hospitals); (4) the gap in saturation with medical personnel, which limits the ability of authors of healthcare policies to respond to identified problems. Also, it was indicated that the gap in saturation with medical personnel may lead to a gap in the adaptation of the personnel resources to the characteristics of patients, which results in a need to take into account the demographic characteristics of patients and the co-existing diseases.

In order to address the gaps that have been identified, it is necessary, based on an analysis of the differences in the structure of incidence and morbidity, to either improve access to screening, or verify the skills of medical personnel in early detection of diseases in the provinces with the worst structure of diagnosis. On the other hand, in order to increase the safety of patients, in the case of extensive and comprehensive operations, it is necessary to centralise them by indicating reference centres in different regions of the country; the first models in this regard have been prepared for solid tumours and for obstetric wards.

Those actions need to be performed in parallel with „moving” diagnostic and treatment procedures to lower organisational levels of the system and between specialities (in the direction of internal medicine, palliative and hospice care, and long-term care). Such actions have been indicated in the area of care for patients with asthma, benign prostatic hyperplasia, and rheumatic diseases. A thorough analysis of healthcare needs maps certainly provides information on many other health problems that should be addressed in accordance with the approach described above.

It is necessary to strengthen the role and increase the number of physicians specialising in geriatrics (due to the increasing number of patients with co-existing diseases) and to regularly monitor the differences in the age and numbers of specialists in various groups. In provinces where the largest shortages are observed, geographic relocations of personnel must be considered. This should go in line with an increase in admissions to different specialities.

The actions described above should be taken not only by individual healthcare providers (in order to maintain or improve their competitive position in the sector), but also by decision-makers who should create appropriate stimuli for changes and for desirable behaviour. This is because not all the recommendations made based on an evaluation of a gap in competencies based on healthcare needs maps can be implemented on the micro scale, as well because the limited periods of employment of the managers of public healthcare institutions and the frequent passive attitudes of the managers (e.g. expectations that debts of hospitals will be paid off by the government) require actions on the higher level. The authors of the article strongly believe that periodic measurement of competencies of healthcare organisations and publication of the results will stimulate gradual reduction of gaps in competencies and, consequently, contribute to a higher quality of healthcare services and an improved effectiveness of the entire healthcare system.

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