

THE EVALUATION OF HOSPITALS BASED ON THE POLISH INSTITUTIONS

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Abstract

The activity of hospitals in many countries raises a lot of heated debate and controversy connected with inter alia insufficient public access to medical services, the allocation of funds, or efficiency in the production process. The present paper is an attempt to systematize tools to evaluate activities of these institutions. The review part is supplemented by an empirical research covering the years 2004-2012 on hospitals run in Poland where DEA method was used to analyse their technical efficiency. It may be also useful in checking how hospitals' expenditures are used in the health service provision and how they affect the hospital activity.

Keywords: hospital, efficiency, hospitals' evaluation, DEA method

1. INTRODUCTION

Hospital is an entity accepting the seriously ill and the bedridden who need medical help, understanding and support. It is "(...) the last refuge from what we cannot evade, a place where foreboding meets hope, it is home to the verge between pain, eternal darkness and the joy of a healthy life." (Holly & Suchecka 2009, p.13).

Historically speaking, the concept of a hospital can be traced back as far as to the ancient times where there existed places like the Greek *Asclepieion*, or Roman *Valetudinaria*, which apart from the spiritual support offered stationary treatment for those needing it the most¹.

Hospital today is more of a highly specialized entity providing treatment, prevention and diagnostic medical services. It is staffed by qualified personnel, has its own state of the art medical equipment, handles huge financial resources necessary for its functioning, and takes out loans if need be. The staff along with medical personnel also includes management and financial specialists which leads us to the conclusion that the hospital is an enormous venture on the borderline of medicine, law, ethics and economics.

The current economic situation as well as the needs and expectations of patients resulted in the creation of private hospitals in many countries. A lot of these entities, however, still operate under the auspices of public units and use public resources². That calls for the expenditure transparency and a reliable analysis of the entities' activity which requires various tools for the assessment of different aspects of the functioning of hospitals. The present study synthesizes the ways of these entities' performance assessment with an additional focus on the technical effectiveness of Polish hospitals.

2. METHODS OF HOSPITALS' ACTIVITY EVALUATION

The primary role of a hospital is to treat and support the ill and distressed in order to soothe their suffering and improve their health. In this context, which in today's world of consumerism is especially crucial, a hospital should be assessed in terms of the fulfilment of its mission in the first place. Unfortunately, due to the fact that quantitative methods do not fit best in examining issues of this type, the questions of ethics, humanism or empathy are not conducive in the assessment of hospital performance. However, the discussion of these issues is present in all kinds of surveys,

¹ Roman legionaries were entitled to hospital care as they were of great strategic importance to the Roman empire (Risse 1999, p.57).

² Health care financing by public resources coming from social contributions is common in such countries as for example Austria, Germany, France, Hungary, Poland (Strzelecka 2011, p.193).

accreditations and other ways of medical service quality assessment due to the fact that the quality of health care services seems to be gaining more and more significance (Suchecka, Strzelecka & Nieszporska 2002). And so the quality of health care can be evaluated subjectively by a potential patient, with the reservation it is done with reference to the technical and substantive sphere of medical services provision. In this sense, quality can be perceived as (Walshe & Smith 2011, p.550):

- reliability
- harmlessness
- efficiency
- esthetics
- durability
- safety.

Due to their unmeasurable nature, not all of the listed quality features can be measured and quantified. And that is why the evaluation of the hospital's performance in this respect is not fully satisfactory.

The functioning of a hospital can be divided into a few areas which, either individually or together, can be indicative of a hospital's performance and management which can enable the assessment of its efficiency, profitability and effectiveness.

Keeping in mind that hospitals generate huge costs and expenditures through their functioning which in many countries are covered by public resources, it is especially important to focus the evaluation on their financial management. Accordingly, it is essential that their organs disposing of the assets and capital make right investment decisions which is connected with the process of choosing long-term assets, projects and programs. In order to do that, hospitals use such classic methods and tools as:³

- Net Present Value – NPV,
- Internal Rate of Return- IRR
- Profitability Index – PI.

One should not forget, though, that hospitals are non-profit organizations which often reduces the applicability of many economic tools in the evaluation of these categories. It is true that health care analyses use such methods as cost-benefit, cost-efficient or cost-utility but these tools are used rather in the macro scale or in relation to specific health programs and not individual hospitals.

Managing a medical entity such as a hospital, especially today when the movement of persons between cities and countries is relatively easy, requires an extremely precise and thought out approach to the problem of acquiring and maintaining qualified personnel in a given unit. Today, that the demand for medical services is increasing in virtually every country, health care managers should concentrate on gathering personnel ensuring effective services on the highest level. According to specialists in this matter (Walshe & Smith 2011, pp. 302-306), there are a few ways of human resources management in medical organizations which include:

- human resources management based on the best practices,
- human resources management based on resources,
- human resources management with the use of the situational leadership model.

Yet regardless of the method, the close relationship between human resources management and the effectiveness of an organization has been long confirmed (Guest & Peccei 1994), which also true for the health care sector.

³ Detailed information on this topic can be found in Rój & Sobiech (2006).

Another aspect influencing the comprehensive evaluation of a hospital performance is the management of medical equipment, technical infrastructure and real estate. Additionally, it seems that the appropriate use of IT in health care is a new challenge for the managers of hospitals. And the solutions meant here are not limited to popular e-mails or pagers, but extend to complete medical information systems or electronic services. Currently, in the evaluation of hospitals' performance in this respect conventional methods are used, such as the cost-benefit analysis. Yet the most problematic task is the quantification of benefits which in the health care sector are usually expressed through (Walshe & Smith 2011, p. 502):

- medical results,
- the improvement in the patient care level,
- the improvement of the quality of the patient's life,
- larger organization efficiency,
- the improvement in the skills of personnel and in the work conditions,
- economic benefit, (e.g. cost-effectiveness, productivity increase),
- economic benefit connected with the quicker return of patients to health and work.

The effective use of all of a hospital's resources is not only an element of the quality of provided services but also determines its general effectiveness. There is, however, no single explicit way to conduct such an assessment to obtain unambiguous results due to the heterogeneity and complexity of hospital output.

3. TECHNICAL EFFICIENCY

Economically speaking, efficiency is: *the situation in which it is impossible to generate a larger welfare total from the available resources* (BusinessDictionary.com 2015). It is also called the allocative efficiency (or price efficiency). The discussion on the subject, apart from the allocative efficiency, also focuses on the technical efficiency which *refers to organizing available resources in such a way that the maximum feasible output is produced* (Levin, Jamison & Radner 1976). The technical efficiency of an analyzed object can be understood as the change of its productivity level caused by a better use of possessed technology. efficiency defined in this way can have values between 0% and 100%. The highest value means that the examined unit is effective whereas if the index is smaller than 100% it is deemed ineffective and the difference between 100% and the level of the index tells about the thriftlessness or ineffective resources use.

One of the technical efficiency measurement methods is the non-parametric DEA method (*Data Envelopment Analysis*) where every analyzed unit has its own inputs and outputs. The maximum measurement level is calculated for each of them which at the same time determines the frontier value. In other words, for the independent variable - the input variable - a desired output value is determined - the dependent variable. The frontier values make the frontier line. Inefficient DMU (Decision Making Units) find their place below it. And the further their longer distance from the frontier means the lower level of their efficiency. Moreover, DEA identifies the source and level of the inefficiency for every output and input (result and outlay) (Charnes, Cooper & Lewin 2000). The reasons of such an inefficiency can be conditioned by external factors not connected with the activity of DMU. It can be also determined by internal factors which could result from mistakes in the management of the unit.

What is important is the fact that the DEA method allows to determine only the relative efficiency and not absolute efficiency.

Data Envelopment Analysis is a way of estimating efficiency defined as a relationship of the weighted sums of production results (outputs) and the weighted sums of outlays (inputs). We can propose, therefore, the following explanation of the efficiency index:

$$Efficiency = \frac{\sum_{k=1}^p \mu_k y_k}{\sum_{i=1}^m v_i x_i}, 0 \leq Efficiency \leq 1,$$

where y_k is the outputs value, μ_k represents the corresponding weigh, and x_i stands for the size of inputs with assigned weighs v_i (Pilyavsky, Golubchikov & Pshenychny 2003).

Every DMU, especially the j-type (DMUj) requires the existence of: x_{ij} inputs ($i=1,...,m$) and y_{kj} outputs ($k=1,...,p$). It is important to remember that x_{ij} and y_{kj} variables are observable variables. We assume, therefore, that every $i = 1,...,m$, $x_{ij} > 0$ and $y_{kj} > 0$ for every $k = 1,...,p$, which means that every DMU has at least one input and output.

The assessment of the technical efficiency of a hospital seems to cause difficulties because as long as the determination and measurement of inputs is relatively easy, the process in the case of outputs is not so. „Hospital outputs consist of improving or maintaining the patient’s state of health on the one hand and the capacity to satisfy an option demand on the other hand. The former part of outputs is particularly difficult to operationalize and can only partially be attributed to the hospital” (Zweifel, Breyer & Kifmann 2009, p.313). That is why the most commonly used variables are: the quantities of factors production, of individual medical and nursing services, the numbers of patients and the number of patient days.

4. TECHNICAL EFFICIENCY OF POLISH HOSPITALS

Since 1999, the Polish health care systems has undergone two structural reforms. After the decades of socialist economy centrally steered, in 1999 the system began the process of decentralization which resulted in the creation of the health insurance fund with its regional branches. Because of inequalities in the access to medical services and differing health care units management strategies in individual Polish voivodships (provinces), in early 2003 another centralization of the system was carried out through the initiation of a central organ playing the double role of an compulsory insurer (the National Health Fund, or NHF), and the payer for services. It has 16 branches in the 16 administrative Polish regions (voivodships). The structure has not been changed so far but the medical services accessibility (Nieszporska 2013) has not improved much and it still varies by regions. Despite the transformations in the health care and legal systems, hospitals (which are mainly public in Poland) struggle with all kinds of problems stemming, among other things, from the NHF underfunding. This raises the question about the criterion and the algorithm of the public funds allocation which are transferred to hospitals by the NHF on behalf of patients.

As stated above, one of the good methods of funds allocation could be the assessment of technical efficiency. In order to do that, information on Polish hospitals was gathered and put in two groups. The first is the inputs which include:

- the number of hospital beds,
- the number of doctors employed in hospitals,
- the number of nurses employed in hospitals,
- NHF outlays on hospitals.

The other group embraces information summing up the performance of hospitals, the result of their activity is measured with:

- hospital patient/days,
- the number of the treated.

Authors do realize that a larger set of factors determining the performance of hospitals would surely paint a more complete picture of their activity. Unfortunately, what hinders such a research is the shortage of data gathered by proper institutions.⁴

Despite the difficulties, the authors attempted the assessment of the technical efficiency of hospitals treating them as a single object within an individual voivodship (data describing the functioning of hospitals were organized with respect to individual regions). It was possible thanks to the uniformity of the analyzed objects in terms of the market conditions in which hospitals operated in the discussed years, the uniformity of the goal of their functioning on the scale of all voivodeships, and the homogeneous set of factors characterizing the operation of these units.

Number	Voivodship	Number	Voivodship
1	Dolnośląskie	9	Podkarpackie
2	Kujawsko-Pomorskie	10	Podlaskie
3	Lubelskie	11	Pomorskie
4	Lubuskie	12	Śląskie
5	Łódzkie	13	Świętokrzyskie
6	Małopolskie	14	Warmińsko-Mazurskie
7	Mazowieckie	15	Wielkopolskie
8	Opolskie	16	Zachodniopomorskie

Table 1. The voivodeships of Poland

Source: Own study

Region	2004	2005	2006	2007	2008	2009	2010	2011	2012
1	100	93.72	96.73	96.62	100	97.31	93.11	87.32	95.17
2	91.75	90.05	96.74	96.12	95.83	97.34	97.09	94.68	95.68
3	100	100	100	100	100	100	100	100	100
4	97.69	96.81	100	100	100	100	100	100	100
5	100	100	97.77	100	100	100	100	98.57	100
6	100	99.44	100	100	100	100	100	98.22	97.61
7	100	100	100	100	100	100	100	100	100
8	100	100	100	100	100	100	100	100	100
9	100	100	100	100	100	99.25	97.4	98.4	99.86
10	96.91	93.47	93.89	94.04	97.6	93.82	95.23	100	98.73
11	93.47	93.3	96.11	92.74	94.83	97.19	98.77	98.65	94.22
12	100	100	100	100	100	100	100	100	100
13	100	100	100	100	100	100	100	100	100

⁴ The presented study, though, is based on an enlarged selection of factors compared to previous years (Nieszporska 2007), since 2004 Polish reporting on such issues seems to have gained more precision.

14	100	100	100	100	100	100	100	100	100
15	100	100	100	100	100	100	100	100	100
16	100	99.78	100	100	100	100	100	98.12	94.73
The average	98.74	97.91	98.83	98.72	99.27	99.06	98.85	98.37	98.50

Table 2. The technical efficiency of hospitals in Polish voivodeships in the years 2004-2012

Source: Own study

The analysis assumed that hospitals operating in individual voivodeships aim at the minimization of their functioning costs through the reduction of outlays, which is why the input-oriented model was applied. The analysis covers the period of 2004 - 2013. For the purpose of the research, the individual Polish regions were marked as shown in table 1.

The results of the calculations concerning the technical efficiency of hospitals in all voivodeships in the years 2004-2012 are presented in table 2.

In all of the examined years, the general hospitals in Poland showed the average technical efficiency on the level of 98.69%. The highest value of the technical efficiency coefficient was observed in the year 2008 (99.27%) and the lowest in the year 2005 (97.91%).

Over the whole discussed period, only 7 out of all 16 voivodeships showed 100% effectiveness of their hospitals in every analyzed year, and two regions can be treated as ineffective in every year, namely kujawsko-pomorskie and pomorskie voivodeships.

The determined average indexes of effectiveness for each voivodeship do not divide Poland into homogeneous regions. That is to say that we cannot state for example that the functioning of hospital in western Poland is more or less effective than of those in the east (fig. 1).

One thing can be said without a shadow of doubt, though. That the voivodeships with the worst results are: pomorskie, kujawsko-pomorskie, podlaskie i dolnośląskie. The level of their technical effectiveness hovered around 95%.

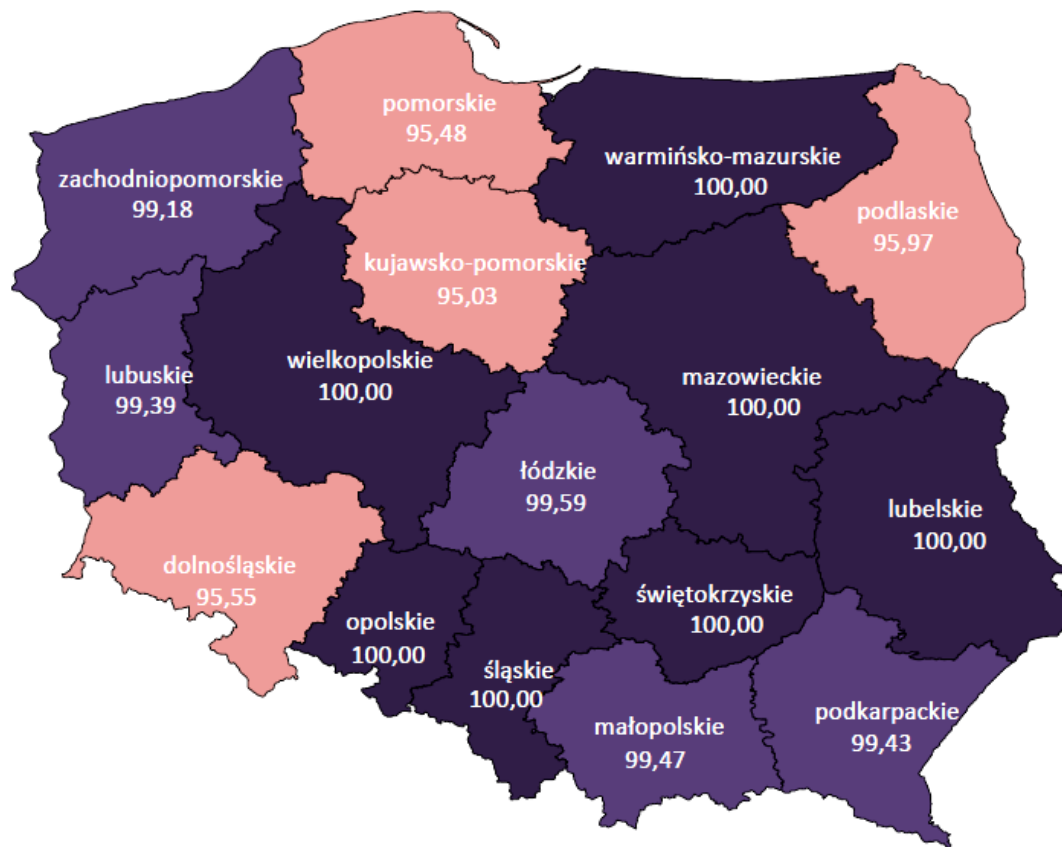


Fig. 1 The average of the technical efficiency of Polish hospitals

Source: Own study

5. CONCLUSIONS

The health care sector is a demanding area when it comes to the quantitative analysis. The main difficulties are undoubtedly connected with the multilevel character of this sector and the absence of clear-cut methods of the quantification of the results in the field of health care services. The market, however, necessitates the use of some tools for the evaluation of medical units functioning because it is their performance that can imply their financing, promotion or even existence.

Among different types of health care entities, the hospital seems to belong with the most important ones. Due to its role in the health care system it requires precise analyses which in many countries do not receive enough recognition.

There are many tools for the evaluation of the performance of hospitals concentrating on one specific aspect of their functioning. The technical efficiency is one of them. It reveals how the resources allocated by the payer are used by hospitals in the process of "production." The present elaboration investigates the functioning of Polish hospitals over the 2004-2012 period and evaluates their technical efficiency which helped to distinguish the regions of the country characterized by the most and least effective performance of hospitals. As far as the regions with the worst results are concerned, the DEA analysis led to the conclusion that in order to improve the technical efficiency in those units the number of medical personnel and the number of beds should be reduced.

From the economic standpoint, the technical efficiency can be the basis for the allocation of resources and should guide every payer in choosing the best service providers that utilize received resources

effectively. The question if the technical efficiency value is in fact the determinant of outlays on hospitals will be answered in further study by the authors.

But it is important to bear in mind that a hospital is not just a plant operating on the market. It is an entity providing very singular services where the quality, technology, well-trained personnel and especially the ethical attitude of the whole staff are the concerns of prime importance. That is why the effectiveness of these units cannot be based on individual aspects such as the work of doctors, managers, carried out research and its results or the effects of the cooperation between the personnel and patients. It is only when all these aspects come together that we are able to determine which unit deserves the name of the most effective one.

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