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EVALUATING THE EFFECTIVENESS OF CZECH HOSPITALS IN THE CONTEXT OF THE VISEGRAD GROUP

HODNOCENÍ EFEKTIVNOSTI ČESKÝCH NEMOCNIC V KONTEXTU ZEMÍ VIŠEGRÁDSKÉ ČTYŘKY

Šárka Papadaki
Tomas Bata University in Zlín, Faculty of Management and Economics, Czech Republic
papadaki@fame.utb.cz

Pavla Staňková
Tomas Bata University in Zlín, Faculty of Management and Economics, Czech Republic
stankova@fame.utb.cz

Abstract:
Expenditure on health is not only growing in the Czech Republic but also in other countries of the world. It is therefore necessary to examine whether these expenses are efficiently consumed. In addition, spending on hospitals accounts for roughly 44% of all spending on health care in the Czech Republic. This article focuses on the comparison of the effectiveness of hospitals within Central Europe. Efficiency is examined on the basis of selected macroeconomic indicators. For comparative purposes countries were selected from among the members of the Visegrad Group. In conclusion, the current situation in the Czech Republic is evaluated as are the limits of this analysis.

Key words:
Health care, hospital, efficiency, Central Europe, Visegrad Group.

Abstrakt:
Výdaje na zdravotnictví rostou nejen v České republice ale i v ostatních státech světa. Proto je nutné se zaměřit, zda jsou tyto výdaje efektivně spotřebovávány. Výdaje na nemocnice navíc tvoří zhruba 44% všech výdajů na zdravotnictví v České republice. Tento článek se zaměřuje na srovnání efektivnosti nemocnic v kontextu zemí střední Evropy. Efektivnost je zkoumána na základě vybraných makroekonomických ukazatelů. Pro porovnání jsou vybrány státy, které jsou součástí Visegrádské čtyřky. V závěru je zhodnocen současný stav v České republice a jsou také diskutovány limity této analýzy.

Klíčová slova:
Zdravotnictví, nemocnice, efektivnost, centrální Evropa, Visegradská čtyřka.

JEL Classification: I11, L14, M21

1 Introduction

Spending on health care per capita has increased in all OECD countries (In 2008 USD 3080 PPP; in 2012 USD 3484). There are, however, great variations in the level of spending per capita across countries. Richer countries tend to spend more [7, 22]. A large part of this spending goes on hospitals which constitute one of the basic pillars of their entire health care systems. In the Czech Republic about 44% of all spending on health care goes on hospitals. It is therefore necessary to focus on hospitals and to compare their effectiveness with those other states. The issue of efficiency is a fundamental problem in all industries and is equally important in the health care sector. Any entity which leads to the production of outputs is responsible for their own performance and efficiency. All players in both the public and private sectors have to work with limited resources. The main objective should be to exploit those resources in such a way as to maximize potential production output. Efficiency within the health care sector is only just beginning to be dealt with. The issue has come to the fore as a result of the need for more expensive technology, the fact that the population is aging and the increasing demand for more health services. This paper aims to evaluate the current situation in terms of the efficiency of utilization of financial resources allocated to hospitals.

2 Literature review

2.1 Efficiency of hospitals

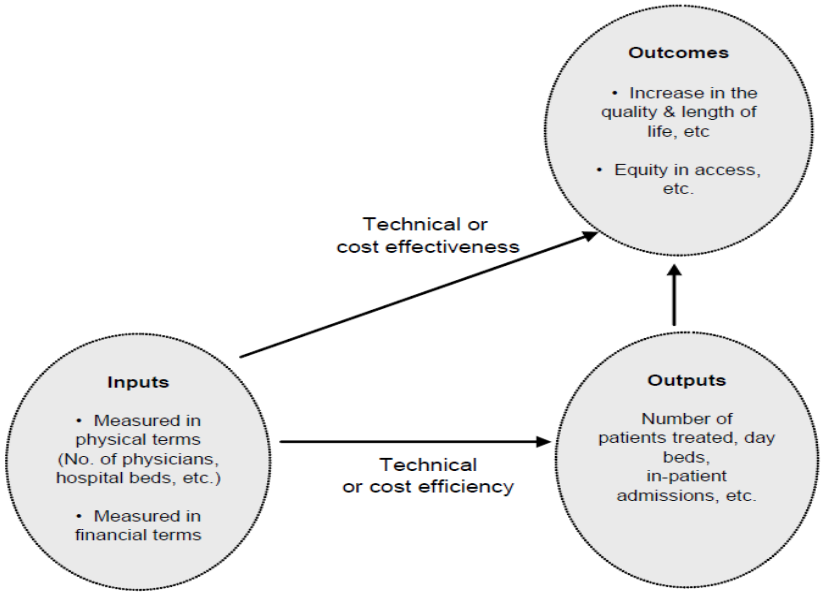
The majority of research in the area of health care efficiency is focused at the company or organizational level. For example, hospital efficiency has attracted much research in recent decades e.g. Barbetta, Prior, Parkin, Rosko, Steinmann, Brennan, Braithwaite [10-17]. Articles by authors such as: Key et. al., focuses on the pharmaceutical industry; Brockett [19] on the Health Maintenance Organizations (HMO) industry; and Bjorkgren [19] on long term care. The majority of the published literature on health care efficiency is related to the production of hospital care. Of the 265 efficiency measures abstracted, 61.1% measured the efficiency of hospitals. Examples of hospital measures include risk-adjusted average length of stay; cost per risk-adjusted discharge; and the cost of producing both risk-adjusted hospital discharges and hospital outpatient visits. [9]

Palmer [20] defines efficiency in health care as the relationship between resources inputs (costs in the form of labour, capital, equipment, etc.) and either intermediate outputs (numbers treated, waiting time, etc.) or final health outcomes (lives saved, life years gained, quality adjusted life years). Although many evaluations use intermediate outputs as a measure of effectiveness, this can lead to suboptimal recommendations. Economic evaluations should focus on final health outcomes.

According to Brown [1], conducting efficiency studies is an effective tool for identifying potential cost savings and assists in prioritizing health care expenditures. Hospital efficiency studies can be categorized by their focus on cost, economic efficiency, productivity, response time, operational efficiency or technical efficiency [2, 3]. Grover and Flagle claim that productivity efficiency should be based on the analysis of the relationship between work levels and health care production. Economic efficiency is an evaluation of the amount of total resources used to produce a unit of output. A study that examines how fast processes can respond to a request for an output measures response time efficiency. Operational efficiency exists when the maximum potential of all resources is attained [3]. Aday, et al. [6] adds that technical efficiency measures the inputs used to create outputs, with a focus on maximizing the use of resources.

According to Popesko and Novák [5] many studies provide evidence of the increasing costs of health care over the last decade. Hospital organizations are under pressure to be able to effectively manage the performed activities and outputs with limited resources. The introduction of modern medical techniques and medicines in order to improve the quality and efficiency of services usually causes an increase in costs. Figure 1 shows the relationships between the inputs and outputs as well as the efficiency and efficacy thereof.

Figure 1: Cost efficiency: outputs and inputs [7]



2.2 A general description of health care within the Visegrad Group

The Visegrad Group (V4) is an alliance of four Central European states - Czech Republic, Hungary, Poland and the Slovak Republic. The members of the Visegrad Group do not only share their geography and history, but also, and more importantly so, the processes of the socio-economic political transformation they underwent. In the context of health care systems, this process means the transition from one based on the Semashko model, to one based on universal social health insurance [21].
In all the selected countries this health insurance is compulsory, the only difference being the rates of contributions. In all the countries there are also voluntary private health insurance schemes.
Total expenditures consists of that of both the public and private sectors. The ratio between the public and private sectors in the selected countries is different. All the countries have levels of public spending that exceed that of their private sectors. The level of health care expenditure is relatively low in comparison to other EU countries, however it has substantially increased over the last two decades (See Table 1).

Table 2: Current expenditure on health care as a % of GDP

Year / Country	2008	2009	2010	2011	2012
Czech Republic	6.7	7.6	7.2	7.4	7.4
Hungary	7.3	7.6	7.8	7.8	7.7
Poland	6.4	6.7	6.5	6.4	6.3
Slovak Republic	7.6	8.6	8.0	7.6	7.8

Source: authors on the basis of OECD data

If we focus on the analysis of the actual costs of hospitals (see Table 2), it is clear that costs in the Czech Republic were the highest over the entire reference period. In 2013, the cost of hospitals in the Czech Republic accounted for 44.5% of health care expenditure. On the contrary, the lowest costs for hospitals were in the Slovak Republic (in 2013, 27.5%). The levels of expenditure in Hungary and Poland were approximately the same.

Table 2: The cost of hospitals as a percentage of total health care expenditure

Year / Country	2008	2009	2010	2011	2012	2013
Czech Republic	43.7	43.6	44.1	43.8	43.4	44.5
Hungary	32.4	31.7	31.3	30.0	33.8	36.4
Poland	35.1	34.6	35.2	34.4	34.8	35.0
Slovak Republic	26.2	25.8	25.0	25.8	26.4	27.5

3 Methodology

According to White and Ozcan, the most common measure of efficiency is collecting and analysing descriptive statistics. This includes comparing the current number of employees, beds, discharges and operating expenses with that of previous years [4]. For this analysis we selected countries from the Organization for Economic Cooperation and Development (OECD). The OECD tracks and annually reports on more than 1,200 health system measures across 30 industrialized countries, ranging from population health status and non-medical determinants of health to health care resources and the utilization thereof [8]. For this analysis the countries that make up the Visegrad Group (Poland, Czech Republic, Slovak Republic and Hungary) were selected.

The data used in the analysis originate from OECD.Stat and cover the period from 2008 to 2013. More recent data were not available.

In the analytical part the trend in the cost per hospital bed was evaluated using the following formula. All data are given per year.

$$\text{The cost of a hospital bed} = \frac{total\ cost\ of\ hospital}{total\ \ number\ of\ beds}$$

For the analysis of the trend in the cost per hospital bed the following formulae were used.

(1) $$\Delta_t = y_t - y_{t\_1}$$

(2) $$k_t = \frac{y_{t\_1}}{y_t}$$

Where:

y… cost of hospital bed

4 Analysis

In the analysis the following indicators were evaluated:

- number of hospital beds per 1,000 inhabitants;
- number of physicians per hospital bed;
- total cost per hospital bed;
- average length of hospital stay;
- occupancy rate

Table 3 shows the total number of hospital beds per 1,000 inhabitants. In all the countries the trend is decreasing. The lowest level was in 2013 in the Slovak Republic where there were only 5.8 beds per 1,000 inhabitants. In the Czech Republic in the same year it was 6.46. The Slovak Republic also saw the biggest decline over the reference period from 6.59 to 5.8 beds.

Table 3: Number of hospital beds per 1,000 inhabitants

Year / Country	2008	2009	2010	2011	2012	2013
Czech Republic	7.21	7.14	7.04	6.84	6.66	6.46
Hungary	7.11	7.14	7.18	7.19	7	7.04
Poland	6.62	6.65	6.59	6.55	6.52	6.58
Slovak Republic	6.59	6.54	6.46	6.05	5.91	5.8

Source: authors on the basis of OECD data

Although expenditure on health care in the Czech Republic is high, the number of physicians per bed is the lowest of all the states. The data are based on the full time equivalent of physicians employed in hospitals.

In 2013, the country with the second lowest number of physicians per bed was the Slovak Republic with just 3.59. Hungary, with almost 6 physicians per hospital bed, was the highest ranking country (See Table 4).

Table 4: Number of physicians per hospital bed

Year / Country	2008	2009	2010	2011	2012	2013
Czech Republic	3.93	3.83	3.76	3.58	3.43	3.33
Hungary	5.26	5.54	4.68	4.32	4.43	4.05
Poland[1]	5.87	5.91	5.83	5.90	5.83	5.84
Slovak Republic	4.56	4.29	4.14	3.95	3.75	3.59

Source: authors on the basis of OECD data

Another indicator that can be evaluated with regards to efficiency is occupancy rate (Table 5). Data on occupancy rates were only available for the Czech Republic, Hungary and the Slovak Republic. The trend is mostly downwards; only the Slovak Republic saw a decline between 2008 and 2011 before increasing once again. The highest occupancy rate was in the Czech Republic in 2012 at 73.1%. This value may be related to the length of hospital stay (Table 6). In 2008, it stood at its highest level in the Czech Republic at 10.2 days, but the trend is downwards. In general, the length of stay decreased by three quarters of a day over the reference period. This trend is set to continue into the future. Hungary and the Czech Republic are now on the same level with 9.5 days. In 2012, people in Poland spent only 7.1 days in hospital and in the Slovak Republic 7.4 days.

[1] Data is based on number of physicians employed in hospitals

[2] N/A = Data is not available

Table 5: Occupancy rate in %

Year Country	2008	2009	2010	2011	2012	2013
Czech Republic	N/A	75.3	73.8	72.8	73.1	73.9
Hungary	75.3	74.3	71.6	71.1	69.2	N/A
Slovak Republic	67.5	67.3	66.5	65.5	67.3	67.4
Poland	N/A					

Source: authors on the basis of OECD data

Table 6: The average length of stay in hospital in days

Year Country	2008	2009	2010	2011	2012
Czech Republic	10.2	10.2	10.2	9.8	9.5
Hungary	9.2	9.3	8.8	9.3	9.5
Poland	7.9	7.7	7.6	7.4	7.1
Slovak Republic	7.8	7.7	7.5	7.3	7.4

Source: authors on the basis of OECD data

Table 7 shows the development of the cost per bed from 2008 to 2013. The data are presented per year in euros. For comparison was used constant prices (OECD base year 2005) and for the conversation was used exchange rate of year 2005. The additional columns show the trends in these costs. The lowest costs per hospital bed per year were EUR 28,090 in Hungary in 2013. In second place was Poland (EUR 29,702 in 2013). The highest cost per hospital bed was in the Czech Republic. In Hungary and Poland the trend in the growth of hospital costs per bed was approximately the same (1.14 and 1.15). The highest overall increase in the growth of costs over the reference period was in the Slovak Republic (1.26). The highest absolute increase (EUR 10,570) over the reference period was in the Czech Republic.

Table 7: Total cost per hospital bed and trend analysis

Year	T	y	Δ_t (1)	k_t (2)	y	Δ_t (1)	k_t (2)
		Slovak Republic			Czech Republic		
2008	1	€ 35 246			€ 47 085		
2009	2	€ 37 443	€ 2 197	1.06	€ 51 488	€ 4 402	1.09
2010	3	€ 35 573	€ -1 870	0.95	€ 51 168	€ -320	0.99
2011	4	€ 38 336	€ 2 763	1.08	€ 53 695	€ 2 527	1.05
2012	5	€ 41 843	€ 3 507	1.09	€ 54 616	€ 921	1.02
2013	6	€ 44 444	€ 2 600	1.06	€ 57 655	€ 3 039	1.06
			€ 9 198	1.26		€ 10 570	1.22
		Hungary			Poland		
2008	1	€ 24 722			€ 25 776		
2009	2	€ 23 322	€ -1 400	0.94	€ 26 816	€ 1 039	1.04
2010	3	€ 24 027	€ 705	1.03	€ 27 738	€ 923	1.03
2011	4	€ 23 492	€ -535	0.98	€ 27 567	€ -171	0.99
2012	5	€ 26 343	€ 2 852	1.12	€ 28 313	€ 745	1.03
2013	6	€ 28 090	€ 1 747	1.07	€ 29 702	€ 1 390	1.05
			€ 3 368	1.14		€ 3 926	1.15

Source: authors on the basis of OECD data

5 Discussion and conclusion

Macroeconomic indicators were used for evaluation of the effectiveness of hospitals. These indicators included the cost of hospitals, number of beds, number of employees, etc. For comparative purposes countries were selected with a similar historical development and similar health systems. These countries are part of the Visegrad Group – Czech Republic, Slovak Republic, Hungary and Poland. On the basis of the analysed indicators it is possible to state that the Czech Republic spends 7.4% of GDP on health care (3rd place), whereby 44% of finances are spent on hospitals, a sum that is much higher than in the other countries. If we evaluate the cost per hospital bed as one of the indicators, it is evident that costs are rising in all the countries. In the Czech Republic the cost in 2013 of one hospital bed was EUR 57,655. This is the highest cost of all the evaluated countries and is directly related to the length of peoples hospital stays. However, it must be noted that the Czech Republic has a relatively high occupancy rate at 73.9% in 2013. In comparison with other countries the number of physicians per bed is the lowest. In addition, if we compare the numbers of other staff working in hospitals it is important to bear in mind that in the Czech Republic approximately 40% are nurses, whereas in Hungary this is approximately 28%. This fact should have an influence on costs because the costs of nurses are lower than for doctors, however this effect is far from clear.

One of the limitations is that OECD does not differentiate the cost of hospital on outpatient and inpatient care. The biggest limitation for this analysis of costs was the conversion of currency exchange rates. The costs were determined in the currencies of the selected countries i.e. Czech Crowns, Polish złoty and Hungarian forints respectively. If we took a different exchange rate the results may have been different. For comparitive reasons it was necessary to establish a single monetary unit. In this case the euro was selected. Other limitations may include inconsistencies in the reporting of individual data e.g. some countries measure the number of doctors other countries measure the number of physicians converted to full-time equivalent.

The individual analyses show that hospitals have reserves within their existing financial resources. It is impossible to say with which of those inputs it would be possible to achieve better outcomes. It is therefore necessary to further analyse the causes of inefficiencies.

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