

EFFICIENCY AUDIT WITHIN THE SOCIAL HEALTH INSURANCE SYSTEM. HOSPITAL SERVICES PROVIDERS IN ROMANIA

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Given how the healthcare sector records a continuous rise of costs, decision factors and theoreticians try to develop policies that will contribute to the improving the way resources are used.

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JEL codes: I11, I12, I18

Introduction

In literature it is well known that the goal of performance audits is to provide information and to ensure the management manner of public resources. This type of audit assesses: “the economy, efficiency and effectiveness of managing public entities by examining the used resource, the information systems and the supply of information, including performance indicators, the monitoring of the results and observing the law and the ethics”³⁵⁷. The most known ways to measure performance are the three traditional Es: economy (*to minimize consumption of inputs*), efficiency (*the relations between inputs and outputs*) and effectiveness (*results compared to expectations*)³⁵⁸.

The present paper tries to determine the performance level recorded by several hospital services providers with the help of one of the three indicators, namely efficiency.

Literature review

Economy, efficiency and effectiveness have been a major concern for all the governments in trying to reform and modernize healthcare systems. It seems the 3Es were adopted as “raison d’etre” of the intervention of public authorities in areas like healthcare³⁵⁹.

There are authors like Hollingsworth & Peacock (2009) that provide a comprehensive overview of stochastic frontier studies which attempted to measure efficiency in hospital or other health services.

Liu & Mills (2007) shows that organizational (hospital) efficiency can be measured by: multidimensional weighted ratio analysis: “outputs are measured by using one indicator derived by converting all types of outputs into an output equivalent, and that the inputs are measured by using either the total cost measure or an input equivalent”³⁶⁰, or by production function analysis used to : “estimate the output elasticity from which scale effects can be derived; elasticity of the input substitution that can be used to measure allocative efficiency in combination with the input prices; and efficiency”³⁶¹.

³⁵⁷ S., Anwar, (2007), *Performance Accountability and Combating Corruption*, International Bank for Reconstruction and Development/ World Bank, Washington, DC, USA, p. 313.

³⁵⁸ J., Wholey, E., Zapico-Goni (2007), *Monitoring Performance in the Public Sector: Future Directions from International Experience*, Transaction Publishers, New Brunswick, New Jersey, SUA, p. 5.

³⁵⁹ M., Marinker (2006), *Conversations about Health: Policies and Values*, Radcliffe Publishing Oxford, Oxford, UK, p. 97.

³⁶⁰ X., Liu & A., Mills (2007), *Public ends, private means: strategic purchasing of health services*, World Bank Publications, Washington, DC, USA, p. 360.

³⁶¹ Idem, p. 365.

Research methodology

In order to conduct this research, we did a documentation based on various analyses, studies, practice handbooks regarding the efficiency of hospital service suppliers. At the same time, the specialized literature, the current legislation, as well as the practical aspects met in the contracting and reporting activity of medical services by providers was also taken into account.

Regarding the size of the sample, we mention that during the analyzed period, 2005-2009, of a total of 68 hospital services providers, which are included in the category of municipal hospitals, 12 units (17.65%) were subjected to analysis. At the same time, it was considered useful that the sample is composed of municipal hospitals that operate in the same development region (Center Regional Development Agency³⁶²). Given that the indicators underlying the analysis of the present study have relatively similar values, we believe that the results of the research can't be distorted significantly.

The indicator according to which the over 80% of hospital services providers contracted budgets with the second credit accountants (Health Insurance Houses) is tariff value for solved case (Diagnosis Related Groups - DRG). According to the law (e.g. Framework Agreement), this indicator is considered a quantitative indicator due to the specific indicators that are included in its structure. The calculus formula for contracted DRG is the Number of discharged cases (NDC) – which is negotiated with the Health Insurance House, multiplied by the Case-mix index from the previous year (CMI) – stipulated in the norms, and multiplied by the Tariff on average case (TAC) – stipulated in the norms. Starting from the calculus formula highlighted above, we tried to conduct a study based on empirical indicators (achieved values of the indicators).

Case study

In the first stage of research, we determined the tariff value for solved case (DRG_{aMH}) achieved by each hospital service provider by multiplying the number of achieved discharged cases ($NDCa$) with the achieved Case-mix Index ($CMIA$) and the achieved tariff on average case ($TACa$) as follows:

$$DRG_{aMH} = NDCa * CMIA * TACa \quad (1)$$

Source: data processed by the author according to the Framework Agreement, 2010

The dynamic of the tariff value for solved case (DRGr)

Table no. 1

Supplier Municipal Hospital (MH)	Year 2009 -lei-	2008 -lei-	2007 -lei-	2006 -lei-	2005 -lei-
Aiud MH (AMH)	13.035.375,13	13.721.660,57	8.423.909,31	8.610.580,34	6.310.430,78
Blaj MH (BMH)	14.424.701,44	13.320.990,27	9.670.934,49	8.142.229,58	7.705.533,07
Sebeş MH (SMH)	12.644.791,78	12.345.072,74	11.216.334,99	7.106.466,52	5.252.441,59
Făgăraş MH (FMH)	14.864.141,87	14.974.200,88	11.303.466,11	9.275.214,85	6.820.803,17
Săcele MH (SMH)	4.163.427,72	3.158.030,46	2.052.123,67	1.497.583,66	550.276,70
Codlea MH (CMH)	3.663.037,50	3.779.643,41	2.990.454,77	1.869.172,03	2.452.606,36
Odorheiu Secuiesc MH	25.744.031,12	24.721.867,17	16.393.636,28	13.158.627,24	11.390.723,31
Topliţa MH (TMH)	9.212.595,72	9.232.686,04	4.496.168,18	3.984.093,31	3.694.323,99
Sighişoara MH (SMH)	16.889.157,60	15.381.927,12	10.041.795,10	8.580.768,78	7.106.603,11
Reghin MH (RMH)	13.465.912,21	12.827.297,34	8.684.663,88	7.037.691,60	5.641.836,22

³⁶² Center Regional Development Agency (ADR Centru) aims to contribute to the sustainable and equitable development of the Center Region by removing disparities and imbalances between areas of the region for the benefit of its inhabitants.

Târnăveni MH (TMH)	19.988.085,60	17.612.227,92	16.645.216,80	10.420.887,38	6.815.895,84
Mediaș MH (MMH)	18.641.004,12	16.919.497,73	11.775.565,39	7.777.400,67	6.718.272,81
DRG_{aMH}	13.894.688,48	13.166.258,47	9.474.522,42	7.288.393,00	5.871.645,58

Source: data processed by the author, 2010

In the next stage, with the help of the relation below, we determined the hospital healthcare service provider that in the last five years recorded the closest value to: the average number of discharged cases, the case-mix index of the tariff on solved case, as follows:

$$f_{MH} = \min(|I_{eMH} - \overline{I_{eMH}}|) \quad (2)$$

Source: data processed by the author, 2010

where:

f_{MH} – the minimum value of the efficiency indicator of the municipal hospital compared to the average

I_{eMH} – the efficiency indicator achieved by the municipal hospital

$\overline{I_{eMH}}$ – the average value of the achieved efficiency indicators

In order to determine which organization has the best value of the f_{MH} function, we determined the values for each indicator (for the number of discharged cases -; the case-mix index - f_{CMIaMH} ; tariff on average case - f_{TACaMH}). The summary of these values, calculated based on the data in Annex no. 1, is highlighted in the following table:

Evolution of the smallest deviation from the minimum value of the analyzed indicators

Table no. 2

Indicator\Year	2009	2008	2007	2006	2005
No of achieved discharged cases f_{NDCaMH}	118	180	323	303	135
Case-mix Index f_{CMIaMH}	0,0030	0,0387	0,0042	0,0052	0,0022
Tariff on average case f_{TACaMH}	8,46	8,46	20,33	3,58	3,44

Source: data processed by the author, 2010

By comparing the data in table no. 2 with the values recorded by each provider, the following aspects can be observed:

-for the Indicator “number of achieved discharged cases” (**NDCa**) there are two hospital units that obtained in the analyzed period the smallest deviations from the average (f_{NDCaMH}), namely Sighișoara Municipal Hospital (with 118 cases in 2009, 180 in 2008, 323 in 2007, and 135 in 2005);

-for the achieved Case-Mix Index (**CMiA**), of all the providers, two obtained the smallest deviations from the average (f_{CMIaMH}) in the same period, namely Reghin Municipal Hospital (0.042 in 2009, 0.0462 in 2008, 0.0110 in 2007 and 0.0165 in 2006) and Mediaș Municipal Hospital (0.0052 in 2006 and 0.0022 in 2005);

-for the tariff on average case indicator (**TACa**), of all the providers, five recorded the smallest deviations from the average (f_{TACaMH}) in the analyzed period. In this case also we can see that

Reghin Hospital had relatively low values of the indicator compared to the average: 34.33 lei in 2007, 40.62 lei in 2006 and 35.56 lei in 2005.

After processing the data in Annex no. 1 with the help of relation number 2, the following values were obtained the values from Table no. 3.

It can be noticed that during those five years the entity with the most representative values compared to the average if Reghin Municipal Hospital (RMH). Even if in 2006 and 2007 it recorded slightly higher values in comparison to the other units, it ranks second in both periods. Consequently, based on what was revealed before, we believe that RMH can be considered the best performer among the providers and the entity at the base of determining the efficiency indicator for the tariff on solved case for the analyzed municipal hospitals.

The minimum value of DRG_{aMH} in the 2005-2009 period

Table no. 3

Provider\ Year	2009 -lei-	2008 -lei-	2007 -lei-	2006 -lei-	2005 -lei-
AMH	859.313,35	555.402,10	1.050.613,10	1.322.187,35	438.785,20
BMH	530.012,95	154.731,80	196.412,08	853.836,58	1.833.887,49
SMH	1.249.896,71	821.185,73	1.741.812,58	181.926,47	619.203,99
FMH	969.453,39	1.807.942,41	1.828.943,69	1.986.821,86	949.157,59
SaMH	9.731.260,77	10.008.228,01	7.422.398,74	5.790.809,34	5.321.368,88
CMH	10.231.650,98	9.386.615,06	6.484.067,64	5.419.220,97	3.419.039,22
OSMH	11.849.342,64	11.555.608,70	6.919.113,86	5.870.234,24	5.519.077,73
TMH	4.682.092,76	3.933.572,43	6.484.067,64	3.304.299,68	2.177.321,59
MHSi	2.994.469,12	2.215.668,65	567.272,69	1.292.375,78	1.234.957,53
RMH	428.776,27	338.961,13	789.858,54	250.701,40	229.809,36
TMH	6.093.397,12	4.445.969,45	7.170.694,39	3.132.494,38	944.250,26
MMH	4.746.315,64	3.753.239,26	2.301.042,98	489.007,67	846.627,23
f_{DRGaMH}	428.776	154.732	196.412	181.926	229.809

Source: data processed by the author, 2010

In the last stage of the study, starting from the formula for determining efficiency, known in economic theory as the ratio between the obtained results and the used resources; the specific criteria of efficiency audit pursued by the Supreme Audit Institutions (SAI) and the data processed previously, we established the following calculation method for the efficiency of the analyzed hospital (e_{DRGaMH}) units:

$$e_{DRGaMH} = \frac{DRG_{aMH}}{DRG_{aPMH}} \quad (3)$$

where:

e_{DRGaMH} – the efficiency indicator tariff on solved case of the municipal hospital

DRG_{aMH} –Diagnosis Related Groups produced by the municipal hospital

DRG_{aPMH} –Diagnosis Related Groups produced by the performing municipal hospital

Following the calculus of the efficiency indicator at the level of each MH, in the examined period, based on the data in Annex no. 1, we obtained the values from Tabel no. 4.

Therefore, we can see that during the analyzed period most providers have recorded values higher than the level considered optimum (≥ 1) for the studied efficiency indicator. Of the municipal hospitals with high values, two are more evident: Odorhoiu Secuiesc Municipal Hospital had a value of the efficiency indicator that exceeded 2 in the year 2005, and for the other years it recorded values over 1.8; Târnăveni Municipal Hospital recorded values from 1.21 (2005) to 9.7 (2007) and in the last year the value was 1.48. At the opposite pole are three municipal hospitals that recorded during the same period much lower values compared to the optimum level: Săcele Municipal Hospital had values between 0.1 in 2005 and 0.34 in 2009; Codlea Municipal Hospital recorded values between 0.43 in 2005 and 0.27 in 2006 and 2009; and Toplița Municipal Hospital has values ranging from 0.65 in the first year and 0.68 in the last year.

The evolution of the efficiency indicator e_{DRGaMH} during the 2005-2009 period

Table no.4

Provider \ Year	2009	2008	2007	2006	2005
AMH	0,97	1,07	0,97	1,22	1,12
BMH	1,07	1,04	1,11	1,16	1,37
SMH	0,94	0,96	1,29	1,01	0,93
FMH	1,10	1,17	1,30	1,32	1,21
SaMH	0,31	0,25	0,24	0,21	0,10
CMH	0,27	0,29	0,34	0,27	0,43
OSMH	1,91	1,93	1,89	1,87	2,02
ToMH	0,68	0,72	0,52	0,57	0,65
SiMH	1,25	1,20	1,16	1,22	1,26
TaMH	1,48	1,37	1,92	1,48	1,21
MMH	1,38	1,32	1,36	1,11	1,19

Source: data processed by the author, 2010

Conclusions

It is known that resources within the healthcare system are limited, regardless of the type of the system or of the organization and functioning economic system of the trade economy, which is why it is *completely immoral to waste them*. An inefficient use of resources in a certain area implicitly determines a lack of services in other areas where they are truly needed. Therefore, it is *a moral requirement* to identify the most efficient manner of organization for all healthcare services and to use *economic rationality* at their level.

At the same time, in literature, it is known that efficiency is related to economy. Also, regarding economy, as well as efficiency, the central concerns are related to the deployed resources. The main question is if these resources were used in an optimum or satisfying manner or if the identical or similar results, in terms of quality, could have been achieved with less resources.

Therefore, next to the indicators calculated in this study (efficiency), we believe that in practice, in order to determine performance for a hospital services provider, the economy, as well as effectiveness, must be taken into account.

Therefore, next to the indicators calculated within this study (efficiency), we believe that in practice, in order to determine the performance of a hospital services provider, the economy, effectiveness, as well as quality indicators must be taken into account (e.g. clinical infections).

References:

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- 5.***The Orders of the Ministry of Health and of the President of the National Health Insurance House numbers: 56/45 of 03.02.2005; 681/243 of 13/02.06.2006; 1.781/CV 558 of 28/15.12.2006; 522/236 of 27.03.2008; 416/428 of 31.03.2009; for the approval of the Methodological Norms for implementing the Framework Agreement regarding conditions for granting medical assistance within the social health insurance system for the years 2005-2009 (published in the Official Gazette of Romania, part I, no. 134 bis of 14.02.2005; no. 569 bis of 30.06.2006; no. 1.057 bis of 30.12.2006; no. 257 bis of 01.04.2008 and no. 210 bis of 01.04.2009).

Annex no.1

Number of discharged cases, Case-mix index and the tariff on average case

Provider\ Year	2009 -lei-	2008 -lei-	2007 -lei-	2006 -lei-	2005 -lei-
<i>Number of achieved discharged cases (NDC)</i>					
AMH	10.193	10.653	10.043	11.924	11.717
BMH	11.874	11.637	11.507	13.101	13.919
SMH	11.954	12.056	12.101	11.786	10.296
FMH	11.911	11.978	12.043	11.999	12.019
SaMH	4.118	3.260	3.073	2.990	1.250
CMH	3.450	3.542	3.553	4.030	2.864
OSMH	21.721	21.525	21.007	22.153	21.509
TMH	7.186	7.714	7.453	7.521	7.973
SiMH	10.900	10.759	10.579	10.959	10.315
RMH	10.462	10.142	10.436	10.864	10.798
TMH	12.900	12.319	13.945	13.354	11.109
MMH	15.550	15.680	15.081	14.459	14.190
NDC average	11.018	10.939	10.902	11.262	10.663
<i>Achieved case-mix index (CMI)</i>					
AMH	0,9174	0,9240	0,7358	0,8234	0,7066
BMH	0,8803	0,8295	0,7811	0,7506	0,7691
SMH	0,8635	0,8359	0,8283	0,7003	0,6811
FMH	0,9043	0,9059	0,7681	0,7864	0,6639
SaMH	0,8005	0,7670	0,6772	0,6599	0,6668
CMH	0,7750	0,7789	0,6887	0,4704	0,9989
OSMH	0,9399	0,9108	0,8062	0,7973	0,8170
TMH	0,9290	0,8673	0,6143	0,7007	0,7044
SiMH	1,1228	1,0360	0,7768	0,7699	0,7791
RMH	0,9327	0,9165	0,7836	0,7929	0,7359
TMH	1,2128	1,9117	0,9832	0,8355	0,7556

MMH	0,9652	0,8688	0,8280	0,7409	0,7502
CMI average	0,9370	0,9627	0,7726	0,7357	0,7524
<i>Tariff on average case (TAC)</i>					
AMH	0,9174	0,9240	0,7358	0,8234	0,7066
BMH	0,8803	0,8295	0,7811	0,7506	0,7691
SMH	0,8635	0,8359	0,8283	0,7003	0,6811
FMH	0,9043	0,9059	0,7681	0,7864	0,6639
SamH	0,8005	0,7670	0,6772	0,6599	0,6668
CMH	0,7750	0,7789	0,6887	0,4704	0,9989
OSMH	0,9399	0,9108	0,8062	0,7973	0,8170
TMH	0,9290	0,8673	0,6143	0,7007	0,7044
SiMH	1,1228	1,0360	0,7768	0,7699	0,7791
RMH	0,9327	0,9165	0,7836	0,7929	0,7359
TMH	1,2128	1,9117	0,9832	0,8355	0,7556
MMH	0,9652	0,8688	0,8280	0,7409	0,7502
TAC average	0,9370	0,9627	0,7726	0,7357	0,7524

Source: data processed by the author according to the Framework Agreement and according to the data of the National School of Public Health and Health Management Bucharest for the 2005-2009 period.