

COMPARISON BETWEEN A MULTI-PAVILION HOSPITAL AND A SINGLE PAVILION HOSPITAL

MIHAI MLEȘNIȚE¹, IOAN STELIAN BOCȘAN²

¹Octavian Fodor Regional Institute of Gastroenterology and Hepatology
Cluj-Napoca, Romania

²Epidemiology and Primary Health Care Department, Iuliu Hatieganu University
of Medicine and Pharmacy, Cluj-Napoca, Romania

Abstract

Background and aim. Defining and measuring hospital efficiency is a hard task, in spite of the agreement that hospitals need to be efficient. Thus, while research might focus on the relationship between costs and outcomes, measurements differ significantly across studies.

The aim of the present study is to compare a multi-pavilion hospital with a single hospital from Cluj-Napoca, Romania.

Methods. Statistical and financial (effective expenses, salaries, drugs, materials, reagents, food) indicators were used to compare two hospitals from Cluj-Napoca: the Adults' Clinical Hospital in Cluj-Napoca, and the Rehabilitation Hospital from Cluj-Napoca respectively. Data related to these indicators were collected at each hospital level, between 2004 and 2010.

Results. When investigating the expenses on medicine, data showed the two hospitals had similar values in 2004, 13.09% and 14.43% for the multi-pavilion hospital and single hospital, respectively. After 2004, the expenses started to drop simultaneously, being around 11% in 2006 and 2007 for both hospitals. The mortality rate was significantly different for the two hospitals. The multi-pavilion had a much higher mortality rate, when compared to the single hospital. From 2004 until 2007 a steady increase was observed for the multi-pavilion hospital, from 1.09 to 2.57 respectively.

Conclusion. The significant differences found between the two hospitals look being unavoidable, as long as they seem to stem from the hospitals' ownership, their addressability and their targeted diseases and associated procedures.

Keywords: public health, health care economics and organizations, hospitals, Romania

Introduction

Background

Hospitals are special institutions for ensuring the wellbeing and health of the population they serve. In the wake of the current ever-changing economic environment, hospitals are confronted with a unique challenge: reducing the expenses of their medical services offered to their patients, while trying to keep or increase the quality of

the medical act. This comes more as a challenge, as more and more professionals constituting the health workforce migrate to more developed countries, in search of better working and living conditions.

Multi-hospital health systems are the most popular administrative structure in the hospital business [1], imposing opportunities as well as challenges for hospital managers. Compared to independent hospitals, multi-system hospitals may offer additional services and procedures through service proliferation, by providing

Manuscript received: 15.10.2015

Accepted: 22.11.2015

Address for correspondence: mihaimle@gmail.com

management expertise and funds to build new facilities and recruit professional health workforce [2].

Economic theory suggests that the creation of multi-system hospitals should be correlated with overall improved hospital performing [3]. This idea stems from the belief that system association leads to improved financial and administrative management, as well as increased access to funding [3]. However, research has found that most hospitals belonging to a multi-system have overall increased costs than independent hospitals [3].

An argument for expenditure differences between hospitals represents the different case mix index they might have, as different illnesses require different sets of procedures and expertise. For example, specialist or teaching hospitals might claim they treat more severe cases, as they hold the reputation for providing specialized treatments and care for critical patients [4]. Specialized care units have the potential to increase the patient capacity, contain costs, and strengthen quality. Consequently, aggregated common tasks can help at reducing healthcare associated expenses, while still improving patient outcomes [5].

The consolidation of a hospital network has been correlated with an effect on pricing almost equal with hospital ownership type, through the establishment of agreements with other hospitals offering the same services [6]. Other studies further sustain this idea, as hospitals within a system were found to receive higher prices of up to 34%, compared to non-system hospitals [7].

When comparing hospitals in terms of efficiency, several factors need to be taken into consideration. For example, teaching hospitals might seem to be ineffective in terms of expenses. However, this is explained by the combination of services they offer, such as education, research and patient care, which are difficult to account for when performing efficiency analysis [8, 9]. Other factors accounting for a hospital's efficiency in terms of structural quality are related to the number of physicians employed and measures of bed availability [10]. Hospital performance, particularly for large hospital systems, is affected by different aspects, such as access to funds, liquid assets or lines of credit [11].

Defining and measuring hospital efficiency is a hard task, in spite of the agreement that hospitals need to be efficient. Thus, while research might focus on the relationship between costs and outcomes, measurements differ significantly across studies [12]. A performing hospital has a low length of hospital stay and low readmission rates, as well as good patient outcomes [13]. Hospitals with good care environments, expert personnel and appropriate staffing levels were found to have a lower mortality rate [13].

Differences in expenses patterns can be explained by the services each hospital offers. Thus, some hospitals might require the acquisition of expensive medical equipment, while others might require a mix of expert personnel, equipment and specialized infrastructure

for carrying out complicated procedures [5]. Similarly, research is also contradictory regarding the relationship between lower costs of hospital care and quality of care. While some studies found that a higher expenses might be associated with a lower level of care [14], other found lower expenses to be a sign of a performing hospital [15], and a good hospital management [16].

Purpose

The aim of the present study is to compare a multi-pavilion hospital with a single hospital from Cluj-Napoca, Romania.

Materials and methods

Hospital description and served population

In this study we analyzed comparatively two tertiary hospitals. The Adults' Clinical Hospital in Cluj-Napoca (which, in the meantime, has been re-organized and is currently named Professor Octavian Fodor Institute of Gastroenterology and Hepatology Cluj-Napoca) is comprised of four pavilions, offering medical services pertaining to psychiatry, obstetrics-gynaecology, orthopaedics-traumatology, and internal medicine, internal surgery and gastroenterology. The addressability of the hospital is high, over 30,000 patients from nearby counties benefitting annually from medical services. The Rehabilitation Hospital Cluj-Napoca is a hospital subordinated to the County Council of Cluj. The single hospital offers medical services of cardiology, neurology, balneology, orthopaedics-traumatology, and plastic and reconstructive surgery. Around 11,000 patients receive treatment annually at the Rehabilitation Hospital from Cluj-Napoca, while 60,000 patients are treated annually in the ambulatory.

A descriptive study was conducted to reach the aim of this study, between 2004 and 2010. A set of indicators was compiled, divided into two main categories: statistics and financial. The researched statistical indicators were: number of hospital beds, number of hospital discharges, number of discharges per doctor, number of discharges per nurse, bed use index mortality, average hospitalization laboratory exams, laboratory exams per patient, para-clinical tests, and para-clinical tests per patient. The following financial indicators were used to compare the two hospitals: effective expenses, salaries, drugs, materials, reagents, food, and others.

Data related to these indicators was collected at each hospital level, from all four hospitals pertaining to the Adults' Clinical Hospital in Cluj-Napoca, respectively the Rehabilitation Hospital from Cluj-Napoca.

Results

Statistical indicators

Eleven statistical indicators were assessed for the purpose of this study. A summary of the results pertaining to each hospital for the statistics indicators can be observed in the tables below.

Table I. Statistical indicators for single hospital.

Indicator (n)	Min	Max	m±stdev
No. of beds (49)	30	90	55±16
No. of discharges (49)	972	3631	1655± 775
No. of discharges/doctor (49)	190	503	337± 81
No. of discharges/nurse (49)	71	192	133± 34
Hospital use index (49)	65	409	280± 95
Mortality (49)	0.00	0.60	0.18±0.20
Average hospitalization (49)	5	52	13± 9
Laboratory exams (49)	29160	127085	53913± 25773
Laboratory exams/patient (49)	29	37	33±3
Para-clinical tests (49)	1295	10245	3987±2261
Para-clinical tests/patient (49)	0.98	3.49	2.31±0.71

Table II. Statistical indicators for multi-pavilion hospital.

Indicator (n)	Min	Max	m±stdev
No. of beds (88)	26	115	57±18
No. of discharges (88)	333	5199	2554±1025
No. of discharges/doctor (88)	164	3156	564±357
No. of discharges/nurse (88)	36	526	172±94
Hospital use index (88)	208	417	310±43
Mortality (88)	0.00	3.27	1.24±1.07
Average hospitalization (88)	3	25	8±6
Laboratory exams (88)	11041	167074	79025±32761
Laboratory exams/patient (88)	25	36	31±3
Para-clinic tests (88)	478	16375	4647±2755
Para-clinic tests/patient (88)	1.43	3.78	1.83±0.78

Significant differences were found between the two hospitals, especially in terms of number of discharges per doctor, and mortality. The highest variability was observed between the indicators for laboratory exams per patient, para-clinical tests and para-clinical tests per patient.

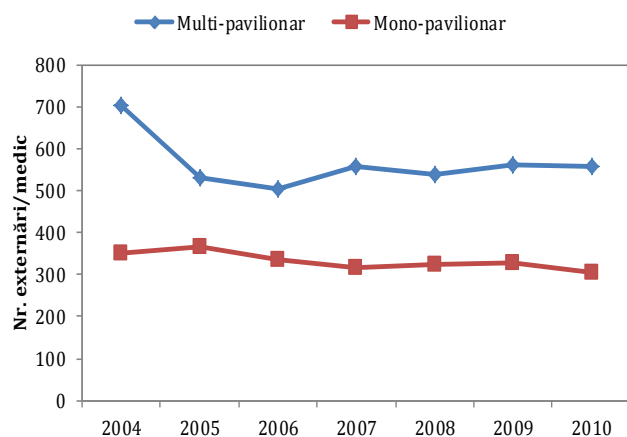


Figure 1. Number of discharges per doctor.

In terms of number of discharges per doctor, the numbers have been consistent over the years for the single hospital, having values ranging from 304 (in 2010) to 365 (in 2005). For the multi-pavilion hospital, a significant difference was observed between 2004 and 2005, when the number dropped from 703 to 532. After 2005, the numbers have been consistent, ranging from 503 (in 2007) to 561 (in 2009).

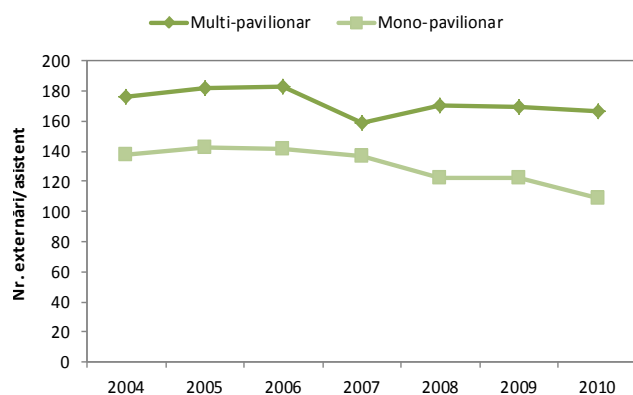


Figure 2. Number of discharges per nurse.

When assessing the number of discharges per nurse, a slight decline was observed for the single hospital. Thus, while the number of discharges per nurse was 138 in 2004, this number dropped to 109 in 2010. For the multi-pavilion hospital, the numbers were consistent for the years 2004-2006 being roughly around 180. A significant drop was observed for 2007, to 159, after which the numbers leveled at around 170 for the 2008-2010 period.

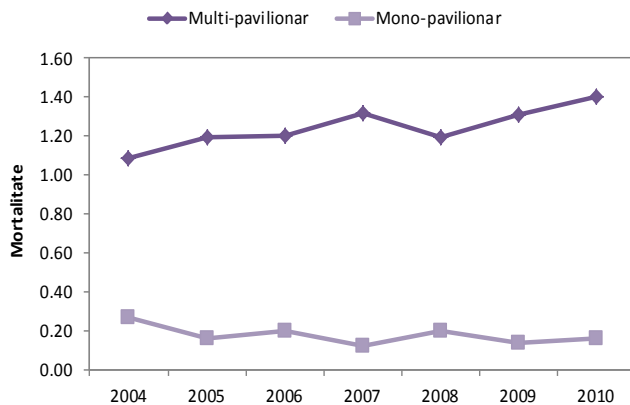


Figure 3. Mortality.

The mortality rate was significantly different for the two hospitals. The multi-pavilion had a much higher mortality rate, when compared to the single hospital. From 2004 until 2007 a steady increase was observed for the multi-pavilion hospital, from 1.09 to 2.57 respectively. This number had dropped to 1.19 in 2008, after which started to increase again, being 1.40 in 2010. The mortality rate for the single hospital showed small variability across the studied period, ranging from 0.27 in 2004 to 0.16 in 2010.

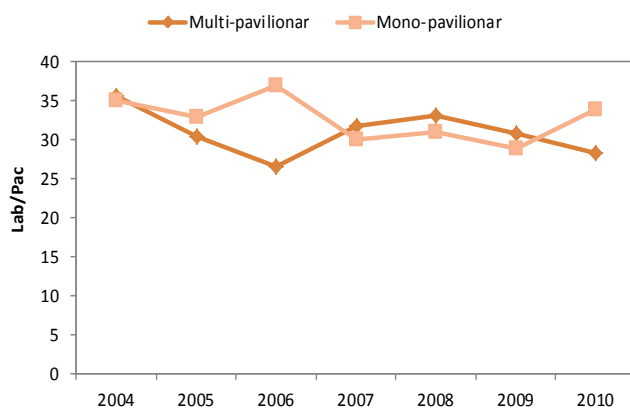


Figure 4. Laboratory exams per patient.

The indicator for laboratory exams per patient had an interesting variability for both hospitals. In 2004, the hospitals had similar values, around 35. After that, the numbers started to slightly increase for the single-hospital, while the numbers for the multi-pavilion hospital started to decrease at the same rate. In 2006, however, a significant difference was observed for the two hospitals, being at around 37 for the single hospital and 26 for the multi-

pavilion hospital. For 2007-2009 the vales were similar for the two hospitals, after which the previously observed phenomenon continued. Thus, in 2010, the values for the single hospital increased at 35, while the values for the multi-pavilion hospital decreased at around 29.

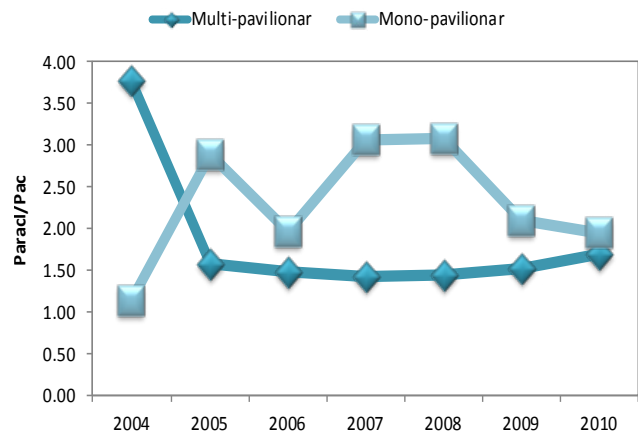


Figure 5. Para-clinical tests per patient.

The para-clinical tests per patient indicator also presented a high variability between the two hospitals, across the studied timeframe. In 2004, a significant difference was observed, as the multi-pavilion hospital had values around 3.70 for this indicator, while the single hospital had values around 1.20. The situation shifted in 2005, though, showing a dramatic decrease for the multi-pavilion hospital to 1.60. Similarly, the single hospital had a dramatic increase in 2005 to 3.00. While the numbers had been consistent since 2005 to 2010 for the multi-pavilion hospital, settling around 1.60-1.70, data from the single hospital showed great oscillations. Thus, the values dropped in 2006 to approximately 1.90, after which they increased again in 2007-2008 at around 3.00. In 2009 the values dropped again at around 2.00, culminating with 1.90 in 2010.

Financial indicators

Seven financial indicators were assessed for the two investigated hospitals. The indicators are expressed as percentages of expenses. The tables below show the summary of the findings on each indicator, for both hospitals.

Table III. Single hospital.

Indicator (n)	Min	Max	m±stdev
% actual expenditure (49)	9.17	30.05	14.29±5.30
% salaries (49)	35.14	72.16	54.66±10.43
% medicine (49)	7.58	23.42	12.22±2.77
% materials (49)	0.56	8.02	4.48±2.30
% reagents (49)	0.30	2.87	0.93±0.63
% food (49)	4.13	14.15	7.18±2.42
% other expenses (49)	2.89	39.73	20.53±11.77

Table IV. Multi-pavilion hospital.

Indicator (n)	Min	Max	m±SD
% actual expenditure (88)	2.67	14.25	7.95±2.94
% salaries (88)	48.93	93.10	67.06±10.63
% medicine (88)	0.76	26.16	9.77±5.73
% materials (88)	0.03	23.35	5.37±4.85
% reagents (66)	0.00	9.15	2.17±2.35
% food (88)	1.53	10.58	3.93±1.84
% other expenses (88)	1.73	24.36	12.23±3.30

Excepting the actual expenditure indicator, all indicators showed certain variability for the investigated timeframe.

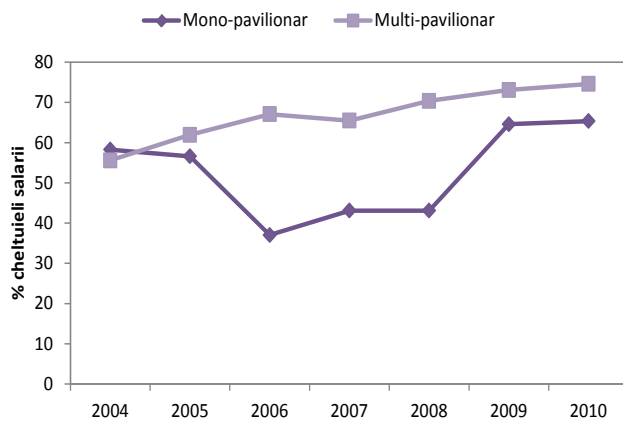


Figure 6. % of salary expenses.

In terms of salary expenses, the multi-pavilion hospital showed a progressive increase across the timespan, from 55.58% in 2004 to 74.62% in 2010. The single hospital showed increased variability, presenting a significant decrease from 58.27% in 2004 to 37.04% in 2006. This percentage has started to increase, though, from 2006 onwards, being 65.37% in 2010.

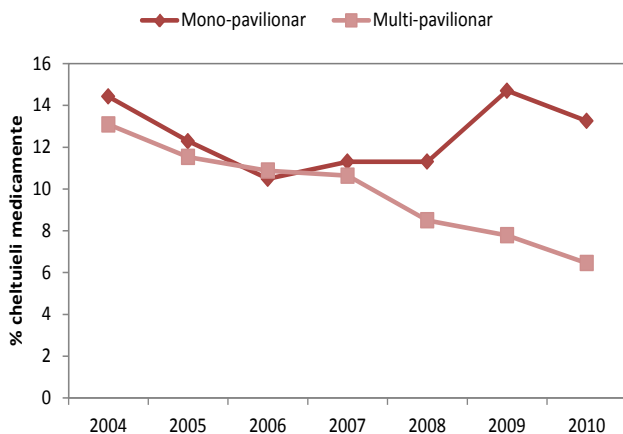


Figure 7. % of medicine expenses.

When investigating the expenses on medicine, data showed the two hospitals had similar values in 2004, 13.09% and 14.43% for the multi-pavilion hospital and single hospital, respectively. After 2004, the expenses started to drop simultaneously, being around 11% in 2006 and 2007 for both hospitals. After 2007 data shows an increase in expenses on medicine for the single-hospital, with a peak of 14.70% for the single hospital. The medicine expenses for the multi-pavilion hospital had decreased significantly, being 6.45% in 2010.

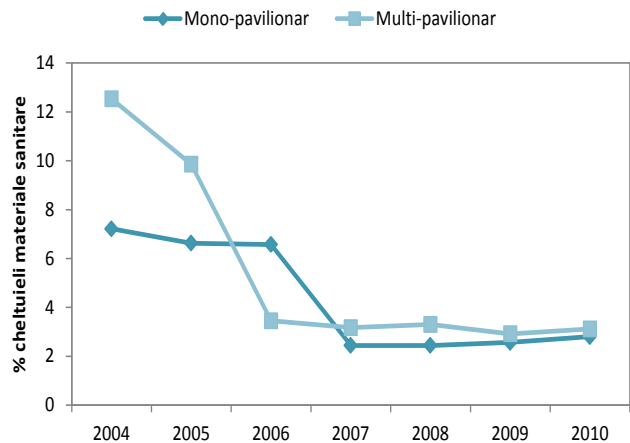


Figure 8. % of materials expenses.

Data on the expenses on materials show a similar phenomenon of decrease for both hospitals. Both hospitals had different percentages spend on materials in 2004, 12.54% for the multi-pavilion hospital and 7.21% for the single hospital. However, after a dramatic decrease of 9.09% from 2004 to 2006 for the multi-pavilion hospital, and a decrease of 4.13% for the single hospital, the hospitals had similar percentages in 2007. From 2007 to 2010 the two hospitals had similar values, the 2010 data being 3.12% for the multi-pavilion hospital and 2.80% for the single hospital.

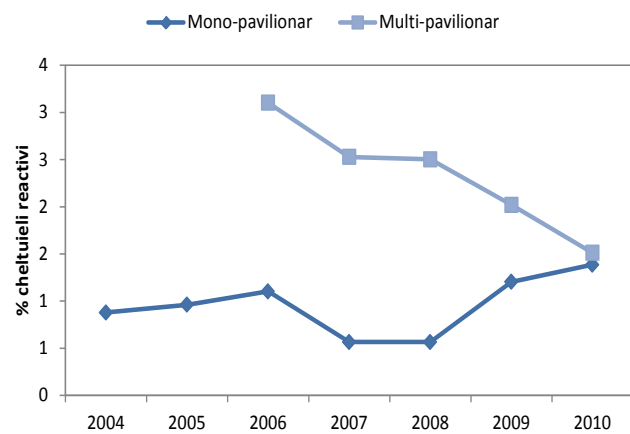


Figure 9. % of reagents expenses.

For the expenses on reagents, data for the multi-pavilion hospital was only available from 2006 onwards. A decrease from 2006 until 2010 can be observed, from 3.10% to 1.15%. Data from the single hospital shows more variability, being characterized by periods of slight increase from 2004 to 2006, then decrease from 2006 to 2008 (around 0.50%), and increase again from 2008 to 1.39% in 2010.

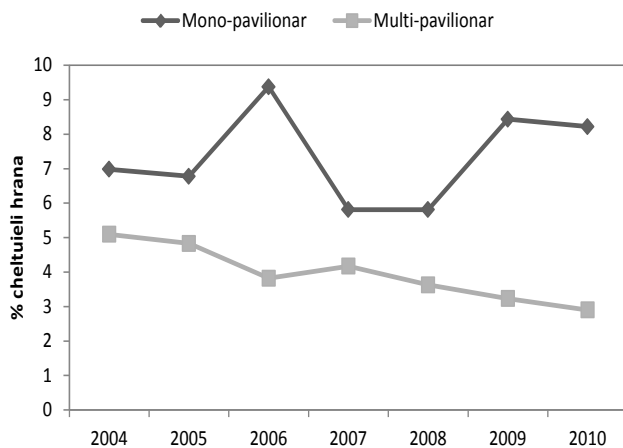


Figure 10. % of food expenses.

The expenses on food for the multi-pavilion hospital show a slight but consistent decrease for the studied period, from 5.10% in 2004 to 2.90% in 2010. Data from the single hospital, though, presents increased variability, with an increase from 6.78% in 2005 to 9.37% in 2006. This increase was followed by a decrease of 3.56% in 2007, having a percentage of 5.81%. Another increase followed after 2008, the percentage spent on food in 2009 being 8.43%.

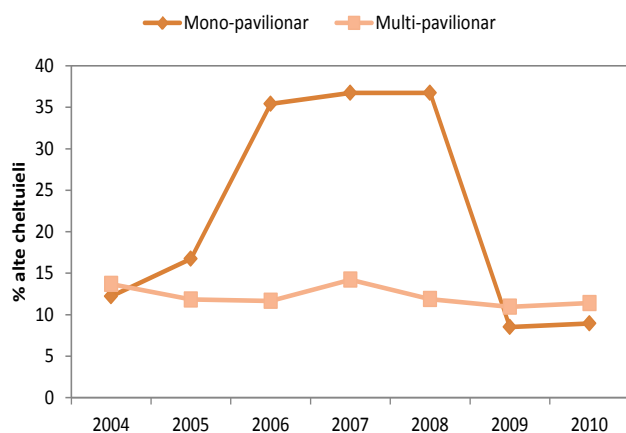


Figure 11. % of other expenses.

In terms of other expenses, the multi-pavilion hospital has shown consistency across the studied timeframe, amounting to percentages around 12% out of the total expenses. The single hospital, on the other hand, presents a high variability between the percentages. A

dramatic increase of 24.53% can be observed from 2004 to 2007, followed by a dramatic decrease of 16.55% from 2008 to 2009. Thus, the single hospital had a smaller allocated percentage of expenses for other expenses from 2009-2010, compared to the multi-pavilion hospital.

Discussion

This retrospective study is – to our knowledge – the first study trying to evaluate the functional particularities of tertiary single pavilion versus multi-pavilion hospitals in North-Western Romania. All data must be seen within the frame of the existing national health policy and specific regulations. The Romanian healthcare system is regulated by Law no. 95 from 2006 with its subsequent amendments, regarding reform in the health sector [17].

At larger scale, few studies were made to determine whether hospitals from multi-system or independent hospitals are more efficient, in terms of expenditure control and overall performance.

The two investigated hospitals, Adults' Clinical Hospital in Cluj-Napoca and the Rehabilitation Hospital Cluj-Napoca, are important health facilities that service the population from Cluj County and surrounding areas. They are owned by the Ministry of Health, respectively by the local City Council. The attempt to determine which hospital type is better performing is a hard task, as many aspects having to be taken into account. As independent entities, single hospitals and multi-system hospitals function through different mechanisms, but share the same goal: delivering quality care to their patients. The aim of this study was to compare the Adults' Clinical Hospital in Cluj-Napoca with the Rehabilitation Hospital Cluj-Napoca, by taking into account a total of eighteen indicators, eleven being statistical and seven being financial. Our study identified several differences between the two hospitals, after assessing the data gathered between 2004 and 2010.

As shown before, significant differences were found between the two hospitals, hypothesized to stem from the hospitals' ownership, their addressability and their targeted diseases and associated procedures. Regarding the statistics indicator, it was identified that the multi-pavilion hospital had higher number of patients discharged per doctor and per nurse, compared to the single hospital. We can attribute this variation to the higher volume of patients Adults' Clinical Hospital in Cluj-Napoca has annually, compared to the Rehabilitation hospital. Additionally, the prestige of the Adults' Clinical Hospital in Cluj-Napoca also contributes to this high number of patients, as the hospital is renowned at a national level for its performance. Finally, the Adults' Clinical Hospital has much more acute patients, with shorter stay, than the Rehabilitation Hospital. Apart from these aspects, previous research also shows that financial incentives within the hospital payment system can impact the disease-specific average length of stay in the hospital.

This may also lead to specific protocols of hospital discharges [18].

When compared to the Rehabilitation Hospital, the higher mortality at the Adults' Clinical Hospital in Cluj-Napoca could be explained by the surgical procedures that the hospital has to offer- often in emergencies. This aspect can be associated with a higher probability of negative outcomes, such as death. Thus, the apparent lower mortality of the Rehabilitation Hospital can be attributed to the profile of patients admitted in this hospital, focused mainly on providing rehabilitation care.

The differences in laboratory exams and para-clinical exams between the two hospitals can also be attributed to types of patients admitted to each hospital. Thus, rehabilitation care is associated with more tests performed on patients, in order to monitor their recovery process. The dramatic decrease for para-clinical exams from 2004 to 2005 for the multi-pavilion hospital might be a result of a cost containment strategy, as these examinations are known to impose high expenses for hospitals in general.

For the financial indicators, differences were noted between each hospital. In terms of salaries, the multi-pavilion hospital data showed higher percentages allocated to salaries, out of the total expenditure. This finding is consisted with previous research, which highlighted that multi-system hospitals had higher expenses than single hospitals [2]. Thus, this higher expense can also be explained by the increased salaries which doctors receive, as they perform more complicated procedures. A study also found that physicians in larger hospitals, regardless of ownership type, receive higher salaries compared to physicians in medium or small hospitals [19]. Additionally, Adults' Clinical Hospital in Cluj-Napoca is renowned nationally for the increased quality of services offered.

Previous research found that hospitals within a system had a 2.8 per cent higher spending per admission, compared to non-system hospitals [20]. Our study found had an opposite result. The higher percentage of expenses allocated to medicine for the Rehabilitation hospital can be attributed to the hospital's profile. Thus, the treatment of patients in rehabilitation relies significantly on drug treatment, which in turn increases the associated expenses. However, former research also shows that measuring hospital inputs and costs per disease, for example, is difficult, due to the lack of information on procedures performed in the ambulatory and medicine consumption per patient [18]. Moreover, another study found that admission expense is reflected by disease severity, average hospitalization days, treatment plans and quality of care [21].

An interesting finding is the fact that the Rehabilitation Hospital had a higher percentage allocated to food expenses, compared to the Adults' Clinical Hospital in Cluj-Napoca, when though it treats less patients annually. We can assume this high expense might be associated with the longer hospital stays recovering patients have, which

contributes to increasing expenses on food. Research on multi-system hospitals is contradictory, however. While some have found that multi-hospital systems have higher costs per case than freestanding hospitals, others have found the contrary [3]. Additionally, data also shows that from an expense point of view, multi-system hospitals had on average higher prices than non-system hospitals [20], which raises questions about cost containment.

However, hospital affiliations do not only affect pricing, though. Multi-system hospitals positively affect the treatment of patients, through two channels. The first channel is connected to the impact of hospital's decision to offer certain services at its locations [2]. However, the effect of service offering also depends on the quality and clinical appropriateness of the procedures undertaken, and of the providers' expertise [2]. Additionally, it is argued that if a hospital offers fewer services, it will likely have higher transfer rates, which in turn might increase expenses. On the other hand, though, lower procedure rates might also imply lower costs [2]. The second channel is connected to the way multi-system hospitals might have improved coordination and information transfer between its hospitals [2].

Doubtless, a multi-specialties hospital could easier provide timely assistance to a larger spectrum of cases than a single pavilion hospital. Unfortunately, the available trustful data did not allow us to evaluate the cost efficiency and the healthcare-associated risks for patients and healthcare workers in these two hospitals.

To conclude, present research has highlighted various aspects of multi-system hospitals, but very few studies approached the issue from a comparison point of view with free-standing hospitals. Thus, very few details on the efficiency and cost effectiveness of free-standing hospitals are known, as opposed to multi-system hospitals.

Conclusions

1. The significant differences found between the two hospitals look being unavoidable, as long as they seem to stem from the hospitals' ownership, their addressability and their targeted diseases and associated procedures.

2. The differences found between the two hospitals are mainly of functional source in relationship with patients' profile.

3. More research is needed to gain a more comprehensive image of the differences between multi-pavilion hospitals and single hospitals.

4. Such knowledge can be useful to learn from each experience and build solutions for cost containment and performance improvement, for each type of hospital.

5. Future research might focus on comparing the 2004-2010 timeframe with present times, in order identify other differences between the two hospital types. Such parameters could also be useful in taking decisions for

improving the healthcare quality in both kind of hospitals. Proposals for new specific legislative regulations could also be an outcome of such deeper studies.

References

1. Yonek, J, Hines, S and Joshi, M. A guide to achieving high performance in multi-hospital health systems. Chicago: Health Research and Educational Trust; 2010.
2. Madison K. Multihospital system membership and patient treatments, expenditures, and outcomes. *Health Serv Res.* 2004;39(4 Pt 1):749-769.
3. Carey K. Hospital cost efficiency and system membership. *Inquiry.* 2003;40(1):25-38.
4. Hvenegaard A, Street A, Sørensen TH, Gyrd-Hansen D. Comparing hospital costs: what is gained by accounting for more than a case-mix index? *Soc Sci Med.* 2009;69(4):640-647.
5. Mahar S, Bretthauer K, Salzarulo P. Locating specialized service capacity in a multi-hospital network. *European Journal of Operational Research.* 2011;212:596-605.
6. Burgess JF Jr, Carey K, Young GJ. The effect of network arrangements on hospital pricing behavior. *J Health Econ.* 2005;24(2):391-405.
7. Melnick G, Keeler E. The effects of multi-hospital systems on hospital prices. *J Health Econ.* 2007;26(2):400-13.
8. Schreyögg J, von Reitzenstein C. Strategic groups and performance differences among academic medical centres. *Health Care Manage Rev.* 2008;33(3):225-233.
9. Farsi M, Filippini M. An Analysis of Efficiency and Productivity in Swiss Hospitals. *Schweizerische Zeitschrift für Volkswirtschaft und Statistik* 2006;142(1):1-37.
10. Folland ST, Hofler RA. How reliable are hospital efficiency estimates? Exploiting the dual to homothetic production. *Health Econ.* 2001;10(8):683-698.
11. Coyne JS, Singh SG. The early indicators of financial failure: a study of bankrupt and solvent health systems. *J Healthc Manag.* 2008;53(5):333-345; discussion 345-6.
12. Edwards Jennifer N, Caroll Sharon Silow, Lashbrook Aimee. *Achieving Efficiency: Lessons from Four Top-Performing Hospitals.* s.l.: The Commonwealth Fund, 2011.
13. Aiken LH, Clarke SP, Sloane DM, Lake ET, Cheney T. Effects of hospital care environment on patient mortality and nurse outcomes. *J Nurs Adm.* 2008;38(5):223-229.
14. Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder E. The Implications of Regional Variations in Medicare Spending. Part 2: Health Outcomes and Satisfaction with Care. *Ann Intern Med.* 2003;138:288-298.
15. Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Aff (Millwood).* 2004 Jan-Jun;Suppl Web Exclusives:W4-184-97.
16. Leatherman S, Berwick D, Iles D, Lewin LS, Davidoff F, Nolan T, Bisognano M. The business case for quality: case studies and an analysis. *Health Aff (Millwood).* 2003;22(2):17-30.
17. Romanian Parliament. *Legea 95 2006 privind reforma în domeniul sănătății, publicată în Monitorul Oficial nr. 372 din 28 aprilie 2006 [Law 95 on the health care reform].* April 28, 2006.
18. Joumard Isabelle, Andre, Cristophe Nicq Chantal. *Health Care Systems: Efficiency and Institutions.* s.l.: OECD Publishing, 2010.
19. Coyne JS, Richards MT, Short R, Shultz K, Singh SG. Hospital cost and efficiency: do hospital size and ownership type really matter? *J Healthc Manag.* 2009;54(3):163-174; discussion 175-6.
20. Cuellar AE, Gertler PJ. How the expansion of hospital systems has affected consumers. *Health Aff (Millwood).* 2005;24(1):213-219.
21. Yin, Su-feng, et al. *Grey Correlation Analysis on the Influential Factors the Hospital Medical Expenditure.* Lecture Notes in Computer Science. s.l.: Springer Berlin Heidelberg, 2010.