

## RESEARCH ARTICLE

# Research Methodologies in Studies on Concentration of American Hospitals

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## Abstract

The objective of this study is to know which methodologies and databases that were used in articles treat variables, such as efficiency and costs in the hospital segment and their relationship with the concentration of American organizations. The quantitative methodologies used were, by order of preference, the multivariate statistical analysis and the econometric analysis. The most used data basis was the Annual Report of the American Hospital Association (AHA), followed by data made available by insurance companies having long lasting relationships with the hospitals analyzed, besides the specific case studies. Finally, it was observed that the concentration in the sector is reflected in the reduction in competition and efficiency gains, notably in the first year after the fusion, which does not mean that there was reduction in the prices charged by the hospitals.

**Keywords:** *Hospital, Research method, Concentration, Cost.*

## Introduction

The concentration of hospitals worldwide seems to be an irreversible tendency. There are several reasons, with the major one being, according to the results found by many studies, related to the search for efficiency for maintaining the sustainability of the organizations involved. On one hand, clients (individual taxpayers, insurance companies, and health insurance providers) loose due to the expressive reduction of service options, causing an impact on the waiting time for these services. On the other, they gain because the operational efficiency increases, which means fewer errors in the assistential processes and provided services [1-8].

Specifically in the United States, the tendency of consolidations occurred in two different times. In the 1990s, there was the first wave of concentration of hospitals in large groups, which ended up by reflecting on the rise of the prices set by insurance companies and health insurance providers.

They reacted with a fusion of several insurance companies as a way to retrieve their dominating position in their capacity of negotiation [9].

A new wave of concentrations of hospitals happened again in the following years particularly after the creation of *The Affordable Care Act* (more commonly known as Obama Care). This program financially rewards hospitals that exceed quality measures and at the same time punishes the ones with poor performance. As most part of the quality improvement is connected to the development and upgrading of the diagnostic technology, the increase of investments has led to new fusions, acquisitions, or affiliations, as a way to reduce costs and risks [10].

Despite this tendency to concentration of hospital organizations, some American studies [11-13] identify the environment of the American hospitals as being competitive.

However, there is an uncomfortable situation for the clients of hospital services: when they need a service, customers have less bargain power due to the reduction of options.

In this context, this study aims to identify the academic studies that analyze the variables efficiency and cost of American hospital organizations, after the processes of fusions and which methodology and data basis are used by them to achieve the results found.

Finally, it is aimed to check if the rise of the first variable and the reduction of the second variable implicate a transfer of the gains to the customer.

### **Theoretical Background**

From the customer's point of view, the rise in prices of health services has been a reality worldwide [14,13]. On the other hand, the search for a solution to the increasing costs and unsatisfactory quality has led to the concentration of hospitals, in order to reduce the double services, through the scale economy [15].

This search is marked by partnerships [16] that can occur through affiliation (without changing the management of each hospital); joint venture (shared management); joint operating agreement (new governance, but each hospital with their own board); fusion (debts and assets are absorbed); and acquisition, where there is the possibility to function semi-independently or being totally subordinated to a single governance [17].

The tendency of increasing the acquisition processes has been responsible for a reduction of 18% in the number of American hospitals and 31% in the number of hospital beds since 2006 [18].

The reduction of American hospital beds can be translated into numbers: in 1981, there were 4.6 beds/1000 people and, in 2008, 2.7 beds/1000 people [6].

While the market does not reach a balance point that is interesting for all those

involved (fair price, quality, economic sustainability), fewer options are offered [13,11]. The reasons for the concentration to continue and the consequent reduction in the number of hospitals and beds are linked to some factors: technology has advanced to such an extent that several procedures can be administered in an outpatient setting (where there is no need of hospital beds); and the concentration rises the negotiation power, including receiving more financial resources, when the expansion of facilities is needed [17].

Other factors explaining this phenomenon can be added: scale economy; qualification and more efficient use of the investments in technology; reduction of the bargain power of plaintiffs, caused by fewer choice options [19]; demographic factors; fees paid by health insurance companies; number of doctors available; quality and variety of the services being offered [2]; deterioration of the cash flow; and search for partnerships [16].

### **Methodology**

For the present study, an applicable, exploratory, systematic review was developed. It was carried out a survey with international articles dealing with the relationship between the consolidation of American hospital organizations and the variables efficiency and costs.

According to Sampaio & Mancini [20], a systematic review is a research medium based on literature data sources on a specific topic, enabling a summary of all studies about a given intervention. Systematic reviews enable the incorporation of a wider range of relevant results, instead of restricting the conclusions of a single study to the reading of few materials. However, they depend on the quality of the primary sources being researched.

For a coherent development of a research process, in a systematic review, a successful sequence of methodological steps must be observed. In this study, the methodology by Sampaio & Mancini [20] was adopted, as it is shown in Table 1.

**Table1: Steps for the systematic review versus steps for the development of this study.**

Steps for the Literature Systematic Review	Steps for the Research of Theses and Dissertations in Brazil
1) Defining the scientific question	What is the relationship between the consolidation of American hospitals and its influence on the variables cost and efficiency?
2) Identifying the databases to be consulted and defining keywords and search strategies	The research was carried out in the EBSCO <i>Information Services</i> basis with the following keywords: <i>healthcare consolidation cost, healthcare merger cost, hospital consolidation cost, hospital merger cost, hospital acquisition cost, hospital merger efficiency, hospital acquisition efficiency, hospital efficiency gain.</i>
3) Establishing criteria for the selection of articles considering the search	The abstract and the methodology sections of the studies were read and two groups were created: studies about the relationship between consolidation and efficiency and the ones about the relationship between consolidation and costs.
4) Conducting a search on the chosen databases following the defined strategies	From September 1st to October 2nd 2014, international articles published between January 1st 2007 and October 2nd 20104 were searched.
5) Comparing the search from the examiners and defining the initial selection of articles	Once the studies searched were analyzed, 117 papers were selected for this research.
6) Applying the criteria in the selection of the articles and justifying potential exclusions	The papers were only selected if addressed a relationship between consolidation and efficiency and consolidation and cost of American hospitals. Besides, they should present a quantitative methodology and the databases used. Papers not addressing this topic nor the methodology and databases were excluded. Thus, 8 articles were included in the group related to cost, and 6 articles were included in the efficiency group. From the 103 papers that were excluded, 7 made econometric analyses based on projection and not on empirical databases; 34 are non-academic articles, though this filter was used during the search; 37 are analyses of European hospitals; and 25 result from qualitative analyses of studies by other authors.
7) Analyzing critically and assessing all the studies included in the review	Information of the papers was organized and tabled, in order to develop analyzes from this.
8) Preparing a critical summary, with the information made available by the articles included in the review	A critical summary was written in a table, where the information of each paper considered as relevant for this study was listed, such as authors, year of publication, periodical, data basis, method, and results found.
9) Presenting a conclusion with the evidence on the intervention effects	From the analysis of the information in the 15 articles, it was possible to understand the relationship between the consolidation of American hospitals, costs, and the resulted efficiency, as well as the potential relationships between consolidation and prices charged.

Source: Adapted from Sampaio & Mancini [20]

From the refinement used to meet the requirements of the present study, 14 articles were selected and divided into 2

groups. They were published in the following periodicals (Tab. 2) and were entirely read to understand the results found:

**Table 2: Periodicals with the selected publications**

Cost Group		Efficiency Group	
Periodical	Number of published articles	Periodical	Number of published articles
International Journal of The Economics of Business	3	The Quarterly Review of Economics and Finance	1
American Journal of Management Care	1	Atlantic Economic Journal	1
Journal of American Medical Association	1	Journal of Healthcare Management	1
Economic Inquiry	1	International Journal of The Economics of Business	1
Health Affairs	1	Managerial and Decision Economics	1
Biomedical Central Health Services Research	1	Healthcare Financial Management	1
<b>Quantity of articles</b>	<b>8</b>	<b>Quantity of articles</b>	<b>6</b>
<b>Total = 14</b>			

Source: Elaborated by the authors.

It is interesting to note that the *International Journal of The Economics of Business* presents four articles, all of them from the same issue of February 2011, as it

can be seen in Table 3. In the same journal, seven articles were found with the econometric analysis, but as they dealt with projections and not empirical data, were excluded, since this study addresses an

empirical relationship between the variables cost and efficiency and consolidations of American hospitals.

### Description and Data Analysis

As the aim of the present study is to identify the academic studies analyzing the variables

efficiency and cost of the American hospital organizations, after the processes of fusion and the methodology and data basis used, the results will be associated with two tables, with Table 3 presenting the title of the articles, authors, title of the periodicals, and other details of the publication:

**Table 3: Details of the periodicals selected**

	Article	Author(s)	Title of the periodical	Year, Vol., Pages
Cost Group	1 The Effect of Hospital Mergers on Inpatient Prices: a case study of The New Hanover-Cape Fear Transaction	Thompson, A.(21)	International Journal of The Economics of Business	V. 18, N 1, pp. 91-101, Feb 2011
	2 The Price Effects of Hospital Mergers: a case study of The Sutter-Summit Transaction	Tenn, S (22)	International Journal of The Economics of Business	V.18, N 1, pp. 65-82, Feb 2011
	3 Hospital Mergers and Competitive Effects: two retrospective analyses	Hass-Wilson, D; Garmon, C.(23)	International Journal of The Economics of Business	V.18, N 1, pp. 17-32, Feb 2011
	4 Hospital Market Concentration, Pricing, And Profitability in Orthopedic Surgery and International Cardiology	Robinson, J.C.(24)	American Journal of Management Care	17 (6): 241-248, 2011
	5 Hospital, Market Share, And Consolidation	Cutler, D.M, Morton, F.S.(8)	Journal of American Medical Association	V 310, N 18, November 13, 2013.
	6 Do Mergers Really Reduce Costs?	Harrison, T.D.(25)	Economic Inquiry	V 49, N 4, pp. 1054-69, October 2011
	7 The Increased Concentration of Health Plan Markets can Benefit Consumers Through Lower Hospital Prices	Melnick, G. A, Shen, Y Wu, V.Y.(26)	Health Affairs	30, N 9, pp. 1728-1743, 2011
	8 Decomposition of the Drivers of The U.S. Hospital Spending Growth, 2001-2009	Wu, V. Y, Shen, Y, Yun, M, Melnick, G.(27)	Biomedical Central Health Services Research	2014
Efficiency Group	1 Measuring Efficiency Gains From Hospital Mergers	Groff, J.E, Lien, D, Su, J.(15)	Healthcare Financial Management	V 11, N 1, pp 77-90, 2007
	2 The Effects of U.S. Hospital Consolidations on Hospital Quality	Mutter, L, Romano, P.S., Wong, H.S.(28)	International Journal of The Economics of Business	V. 18, N 1, pp. 109-126, Feb 2011
	3 The Effect of Non-rural Hospital Mergers and Acquisitions: an examination of cost and price outcomes	Spang, H.R, Arnould, R. J, Bazzoli, G.J.(29)	The Quarterly Review of Economics and Finance	49, pp. 323-342, 2009
	4 The Focus Efficiency of U.S. Hospitals	Ferrier, G.D, Leleu, H, Moises, J, Valdmanis, V.G.(5)	Atlantic Economic Journal	41: 241-263, 2013
	5 Hospital Cost and Efficiency: do hospital size and ownership type really matter?	Coyne, J.S, Richards, M.T,	Journal of Healthcare Management	54:3, May/Jun 2009
	6 The Impacts of Hospital Alliance Membership, Alliance Size, And Repealing Certificate of Need, Regulation, on The Cost Efficiency of Non-Profit Hospitals	Short, R, Schultz, K. Vingh, S.G. (30) Granderson, G.(31)	Managerial and Decision Economics	32: 159-173,2011

Source: Elaborated by the authors.

Table 4 presents an abridged description of

the results found according to the group being analyzed:

**Table 4: Methodology, data basis, and results**

	Article	Methodology	Data basis	Results
Cost Group	1 The Effect of Hospital Mergers on Inpatient Prices: a case study of The New Hanover-Cape Fear Transaction	Econometric Analysis	Data from 5 insurance companies associated with an organization resulting from a fusion, both before and after the fusion	Reduction of costs did not have an impact on the reduction of prices. 4 out of 5 insurance companies had their prices raised oscillating between 18% and 24%
	2 The Price Effects of Hospital Mergers: a case study of The Sutter-Summit Transaction	Econometric Analysis	Data from 2 hospitals that were consolidated and 3 insurance companies associated with an organization resulted from a fusion, both before and after the fusion	Reduction of costs did not have an impact on the reduction of prices. Three insurance companies had their prices raised oscillating between 23.4% and 50.4%
	3 Hospital Mergers and Competitive Effects: two retrospective analyses	Econometric Analysis	Data from 2 hospitals that were consolidated and were object of analysis from the Federal Trade Commission (FTC) and 3 insurance companies associated with the organization resulted from the fusion both before and after the fusion	Reduction of costs did not have an impact on the reduction of prices. Four insurance companies had their prices raised in 10% and only one maintained the prices charged before the fusion.
Efficiency Group	4 Hospital Market Concentration, Pricing, And Profitability in Orthopedic Surgery and International Cardiology	Multivariate Statistical Analysis	Data from 11,330 patients treated in 61 consolidated hospitals from 8 American states compared to a control group of hospitals from the same states acting independently	Hear surgeries had prices between 13% and 25.1% higher than the prices charged in independent hospitals. For the orthopedic surgeries, prices varied upwards between 19.2% to 24.1% in relation to independent hospitals
	5 Hospital, Market Share, And Consolidation	Econometric Analysis	The 2010 Annual Report of the AHA, analyzing 306 hospitals considered as regional reference	Reduction of the competition in the regions with a higher number of consolidations, smaller costs for economy scale reasons in the period after the fusion and higher bargain power along with the insurance companies
	6 Do Mergers Really Reduce Costs?	Multivariate Statistical Analysis	The 1984 Annual Report of the AHA, from 1984 to 1998, analyzing all the 6,487 hospitals that went into fusion with only one other organization. All fusions with more than one partner were dismissed	Cost economy was found in the following moment after the fusion. When compared with the years after the fusion, the first year is the one that presents more substantial economy
	7 The Increased Concentration of Health Plan Markets can Benefit Consumers Through Lower Hospital Prices	Multivariate Statistical Analysis and the Herfindahl-Hirschman Index (HHI)	Data from insurance companies associated with 2,276 hospitals from all the metropolitan regions from 2001 to 2004	2,111 hospitals operate in markets, where their concentration is higher than the concentration indexes of health insurance providers. For each point in the rise of concentration indexes (HHI) of health insurance providers, there are 2.5 points in the reduction of the hospital prices. On the other hand, for each 1 point in the hospitals' HHI, there is a rise of 8.3 in the hospital prices
	8 Decomposition of the Drivers of The U.S. Hospital Spending Growth, 2001-2009	Multivariate Statistical Analysis	Annual Report of the AHA, from 2001 to 2009, analyzing only hospitals already existing in 2001 that treated acute heart diseases and that later went into fusion	As heart procedures need to incorporate more technology and are not available in a non-specialist hospital, consolidations enable a better use of the facilities in 9% and a real growing of 42% and nominal growing of 64% in prices
Efficiency Group	1 Measuring Efficiency Gains From Hospital Mergers	Multivariate Statistical Analysis	The 1992 Annual Report of the AHA, with 5,619 short-stay (max. 30 days) hospitals being randomly selected. None of the institutions could have been subject to any kind of fusion in 1992 and 1993	The years 1994 and 1995 were analyzed, when fusions occurred, enabling the analysis of the efficiency in the years 1996 and 1997. Evidence of efficiency improvement was found only in the first year of fusion
	2 The Effects of U.S. Hospital Consolidations on Hospital Quality	Multivariate Statistical Analysis	Annual Report of the AHA, from 1999 to 2000, of 42 markets, where there were consolidations involving 136, in 16 American states	In 1999, the control group (no fusion) included 425 hospitals, whilst in the following year there were 450 hospitals. Evidence indicating the rise in the quality of services provided was not found

3	The Effect of Non-rural Hospital Mergers and Acquisitions: an examination of cost and price outcomes	Multivariate Statistical Analysis and the Herfindahl-Hirschman Index (HHI)	Annual Report of the AHA, from 1988 to 1997, regarding 1,165 hospitals that went into fusion in the period being analyzed	Evidence of efficiency gains was found, but they were transferred to the customer as minor readjustments of the prices in the high competition markets. In low competition market, higher readjustments were found
	4	The Focus Efficiency of U.S. Hospitals	Econometric Analysis	Annual Report of the AHA, from 2004 to 2007, regarding 1,940 hospitals from metropolitan regions in USA

Source: Elaborated by the authors.

**Table 4: Continued**

	Article	Methodology	Data basis	Results	
Efficiency Group	5	Hospital Cost and Efficiency: do hospital size and ownership type really matter?	Multivariate Statistical Analysis	Reports by the Washington State Department of Health, in 2006, with 98% of the existing hospitals	Evidence that the size interferes with the hospital's efficiency and cost reduction was found. Independent hospitals were less efficient.
	6	The Impacts of Hospital Alliance Membership, Alliance Size, And Repealing Certificate of Need, Regulation, on The Cost Efficiency of Non-Profit Hospitals	Multivariate Statistical Analysis	Annual Report of the AHA and the Medical Cost Report Data, from 1996 to 1999, regarding 144 hospitals from the American Mid-West	Being part of only one alliance is more efficient than being part of more than one alliance. The higher the number of members of this alliance, the higher the efficiency is.

Source: Elaborated by the authors

Due to the extensive volume of available data, the use of multivariate statistical analysis by 4 of the 8 papers related to costs and 5 of the 6 studies related to efficiency is not surprising. The econometric analysis was the choice made by 4 studies related to costs and only one related to efficiency. Moreover, two studies used the concentration index HHI. This index, when measuring the number of existing organizations of one segment of a market, considers that whenever an index indicates a value equals to or higher than 1,800, there is a high concentration of services/products in few companies.

In general, whenever there is a fusion of hospitals, the efficiency increases, notably in the first year after the fusion, as two of the studies show. Consequently, it implies the cost reduction. However, this does not guarantee that the gains will be transferred to the plaintiffs (health insurance providers and companies, besides the individual clients). Only one study shows that it is possible to have minor readjustments in the prices in markets where there is high competition, but not a reduction of the

prices. Seven of the 8 studies addressing the topic cost show that there was a rising in the prices charged by hospitals after the process of fusion.

One of the studies [29] shows that the rise in efficiency did not trigger the rise in the quality of the services offered. The other studies did not make an association between efficiency gains and quality, probably because they are a subjective criterion, as highlighted by Hass-Wilson & Garmon [23], when explaining the reason not to include the variable quality in their study. Other studies present relevant knowledge to other research areas. Ferrier et al. [32] highlight the relevance of the location of the hospital facility.

If it set in a location with few hospitals, it is strategically interesting that more options of specialties are offered (scope gain), which can cause loss in scale, for not focusing on one or few specialties. For the studies on inter-organizational relationships, the paper by Granderson [31] presents an interesting analysis of alliances, showing that being part of only one alliance is more efficient

than being part of many others simultaneously. The author highlights also that the higher the number of members of an alliance, the higher the efficiency is.

In relation to the databases used, the Annual Report of the AHA was the biggest source of information for 8 of the 14 studies presented. Three studies used the data made available by insurance companies associated with hospital organizations before and after the fusion; one used the data from the Washington State Department of Health, since the analysis was concentrated only in that region; and the others analyzed specific cases of fusion, with direct data from hospitals or from the Federal Trade Commission.

### Final Considerations

The concentration of American hospitals worldwide seems to be an irreversible tendency. There are several reasons, with the major one being the search for efficiency for maintaining the sustainability of the organizations involved. Clients (individual taxpayers, health insurance companies, and health insurance providers), on the other hand, seem to loose due to the expressive reduction of options, causing an impact on the rise of the prices charged. Yet, there is no guarantee that the efficiency gains mean a rise in quality of the provided services.

The access to the information enabled a number of analyzes that can be useful both for the strategic decision-making of the hospitals and for the Public Entity since it

regulates the market. In the American case, the Annual Report of the AHA is an accessible database, with important information about American hospitals, besides presenting a historic series, enabling researchers to make ex-ante and ex-post comparisons. The use of quantitative methodology, for the analysis of this big volume of data, seems to be the most sensible choice, along with the use of multivariate statistical analysis, followed by the econometric analysis. It is important to emphasize that the mention of the use of the HHI concentration index by only two studies does not reflect what is presented in studies with econometric analysis, since in their formula the concentration of the sector being studied was considered.

The keywords used for searching in the data basis chosen; the exclusion of papers not using empirical data; and the use of the EBSCO base as the only research source can be considered limitations of the present study what reflected on the number of articles presented. However, the ones presented brought new knowledge, such as the impact of the location as a factor to be weighed in strategic decisions, as well as the influence on the number and size of the alliances made.

### Remark

International Conference on Industrial Engineering and Operations Management, International IIE Conference 2015, Aveiro, Portugal. July 6-8, 2015.

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