




ORGANIZATIONAL MANAGEMENT PERFORMANCE OF HOSPITAL SERVICES IN BRAZIL
DESEMPENHO DA GESTÃO ORGANIZACIONAL DOS SERVIÇOS HOSPITALARES NO BRASIL
DESEMPEÑO DE LA GESTIÓN ORGANIZATIVA DE LOS SERVICIOS HOSPITALARIOS EN BRASIL

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ABSTRACT

Objective: to assess the organizational management performance of hospital services in Brazil. **Method:** a cross-sectional study that resorted to data from the 2015-2016 National Program for the Evaluation of Health Services (*Programa Nacional de Avaliação dos Serviços de Saúde*, PNASS) to assess the Organizational Management Performance in 1,665 Brazilian hospitals. A total of 30 verification items distributed into 5 criteria (Contract Management; People Management; Information Management; Planning and Organization; and Organizational Model) were used, which comprised an evaluation score. Performance was assessed according to the following indicators: hospital size; complexity level; administrative sphere; type of management; and region of the country. An association was verified between the hospitals' Organizational Management Performance and the Occupancy Rate, Mean Hospitalization Time and Mean HA Value indicators. Principal Components Analysis was used to verify the dependence relationship between the variables and to explain data variability. An adjusted logistic regression model was used to verify variable that best explain Organizational Management Performance. **Results:** the hospitals' mean Organizational Management Performance was 63.83. The best performance levels correspond to the hospitals from the South region, Complexity level 8, more than 150 beds, belonging to the Federal Public Administrative Sphere and with State Management. In the logistic regression analysis, performance proved to be associated with: Occupancy Rate ($p < 9.87E-09$), Hospital size ($p < 4.49E-10$), Municipal Management ($p < 0.004$), Hierarchical Level 7 ($p < 0.042$), Level 8 ($p < 0.022$), South region ($p < 0.004$), and Southeast region ($p < 0.002$). **Conclusion:** the PNASS proved to be adequate to assess the hospitals' management performance, verifying a relationship between better performance and larger hospital size and higher complexity.

Keywords: Health Evaluation; National Health Programs; Health Services Administration; Hospital Administration; Health Management.

RESUMO

Objetivo: avaliar o Desempenho da Gestão Organizacional dos Serviços Hospitalares no Brasil. **Método:** estudo transversal que utilizou dados do Programa Nacional de Avaliação dos Serviços de Saúde-PNASS 2015-2016 para avaliar o Desempenho da Gestão Organizacional de 1.665 hospitais do Brasil. Foram utilizados 30 itens de verificação distribuídos em 5 critérios (Gestão de Contratos; Gestão de Pessoas; Gestão da Informação; Planejamento e Organização; e Modelo Organizacional), que compuseram um escore de avaliação. O desempenho foi avaliado segundo os indicadores: porte hospitalar; nível de complexidade; esfera administrativa; tipo de gestão; e região do país. Verificou-se associação entre Desempenho da Gestão Organizacional dos hospitais com os indicadores Taxa de Ocupação, Média de Permanência e Valor Médio da AIH. Utilizou-se Análise de Componentes Principais para verificar a relação de dependência entre as variáveis e explicar a variabilidade dos dados. Foi utilizado o modelo de regressão logística ajustado para verificar variáveis que melhor explicam o Desempenho da Gestão Organizacional. **Resultados:** a média de Desempenho da Gestão Organizacional dos hospitais foi 63,83. Os melhores desempenhos estão nos hospitais da região Sul, de nível de Complexidade 8, acima de 150 leitos, de Esfera Administrativa Público Federal e de Gestão Estadual. Na análise de regressão logística, o desempenho se mostrou associado com: Taxa de Ocupação ($p < 9.87E-09$), Porte hospitalar ($p < 4.49E-10$), gestão municipal ($p < 0.004$), Nível Hierárquico Nível 7 ($p < 0.042$), Nível 8 ($p < 0.022$) região Sul ($p < 0.004$), Sudeste ($p < 0.002$). **Conclusão:** o PNASS se mostrou adequado para avaliar o desempenho da gestão dos hospitais, sendo constatada relação entre melhor desempenho e maior porte e complexidade do hospital.

Palavras-chave: Avaliação em Saúde; Programas Nacionais de Saúde; Administração de Serviços de Saúde; Administração Hospitalar; Gestão em Saúde.

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RESUMEN

Objetivo: evaluar el Desempeño de la Gestión Organizativa de los Servicios Hospitalarios en Brasil. **Método:** estudio transversal que utilizó datos del Programa Nacional de Evaluación de Servicios de Salud-PNASS 2015-2016 para evaluar el Desempeño de la Gestión Organizativa de 1665 hospitales en Brasil. Se utilizaron 30 elementos de verificación distribuidos en 5 criterios: Gestión de Contratos, Gestión de Personas, Gestión de la Información, Planificación y Organización, Modelo Organizativo, que compusieron una puntuación de evaluación. El desempeño se evaluó en función de los siguientes indicadores: tamaño del hospital, nivel de complejidad, ámbito administrativo, tipo de gestión y región del país. Se verificó una asociación entre el Desempeño de la Gestión Organizativa de los hospitales con los indicadores: Índice de Ocupación, Tiempo Medio de Internación y Valor Medio de las Órdenes de Internación. Se utilizó el análisis de Componentes Principales para verificar la relación de dependencia entre las variables y explicar la variabilidad de los datos. Se utilizó el modelo de regresión logística ajustada para verificar las variables que mejor explican el Desempeño de la Gestión Organizativa. **Resultados:** la media de Desempeño de Gestión Organizativa de los hospitales fue de 63,83, los mejores desempeños correspondieron a los hospitales de la región Sur, con Nivel de Complejidad 8, con más de 150 camas, Esfera Administrativa Pública Federal y Gestión Estatal. En el análisis de regresión logística, el desempeño se asoció con: Índice de Ocupación ($p < 9,87E-09$), Tamaño del hospital ($p < 4,49E-10$), Gestión Municipal ($p < 0,004$), Nivel Jerárquico Nivel 7 ($p < 0,042$), Nivel 8 ($p < 0,022$) Región Sur ($p < 0,004$), Sureste ($p < 0,002$). **Conclusión:** el PNASS demostró ser adecuado para evaluar el desempeño de la gestión de los hospitales, encontrándose una relación entre un mejor rendimiento y un mayor tamaño y complejidad del hospital.

Palabras clave: Evaluación en Salud; Programas Nacionales de Salud; Administración de los Servicios de Salud; Administración Hospitalaria; Gestión en Salud.

INTRODUCTION

According to the Ministry of Health, hospital care within the Unified Health System (*Sistema Único de Saúde*, SUS) must be organized based on the population's needs, with the objective of ensuring multiprofessional, resolute and humanized care, valuing quality of the care provided and patient safety.¹ Thus, the National Policy on Hospital Care (*Política Nacional de Atenção Hospitalar*, PNHOSP) seeks to qualify hospital assistance, establishing guidelines for the organization of the hospital component in the Health Care Network (HCN) which applies to all hospitals (public or private) that provide health actions and services in the SUS.¹

The evaluation of health services has been increasingly used as a tool to support management in the SUS, aiming to contribute to the identification of problems, redirect planning and measure the impact of implementing policies, programs, services and actions on the health status of the population.² In 1998, the Ministry of Health (*Ministério da Saúde*, MS) developed an important instrument for the Evaluation of Health Services, the National Program for the Evaluation of Hospital Services (*Programa Nacional de Avaliação de Serviços Hospitalares*, PNASH), which assessed user satisfaction in emergency, outpatient and inpatient units of public and private hospitals linked to SUS in 2001 and 2002. In August 2003,

other complexities of health services were incorporated to the PNASH, thus originating the National Program for the Evaluation of Health Services (*Programa Nacional de Avaliação de Serviços de Saúde*, PNASS).³ The PNASS was reformulated in 2015 and, in 2015-2016, it evaluated the specialized care, outpatient and inpatient facilities regarding the dimensions of structure, process, outcome, care production and risk management, as well as user satisfaction regarding the care received.⁴

Organizational Management is one of the blocks of the 2015-2016 PNASS and consists of the activity that involves the processes of planning, organizing, directing and controlling human, physical material, and financial resources in order for positive results to be produced. With this, it aims at enhancing organization performance and enabling achieving pre-established objectives for the organization.⁵

Considering the large number of hospital that comprise the SUS and the importance of these services in the health care provided to the population, it becomes relevant to assess them from the perspective of organizational management. Thus, the study seeks to evaluate the performance of Organizational Management of Hospital Services based on the 2015-2016 PNASS and its relationship with hospital management indicators, administrative variables and Brazilian regions.

METHODOLOGY

This is a cross-sectional study that analyzes the database of the National Program for the Evaluation of Health Services (PNASS) collected in the 2015-2016 survey. The PNASS was applied by groups external to the Ministry of Health (MS), assembled by means of partnerships between the MS and federal universities. The people interviewed were the hospitals' managers (or their representatives, such as administrative clerks in charge), engineers, physicians and Nursing team.

The PNASS evaluated 2,589 health institutions in Brazil, of which 1,761 were hospitals in the 27 states of the Federation that received support from the MS through priority projects and Incentives for Adherence to Contractualization (*Incentivo de Adesão à Contratualização*, IAC). Facilities with strategic certifications were selected, such as *Rede Cegonha*, the Urgency and Emergency Network, Substitute Renal Therapy (SRT), Specialized Rehabilitation Centers (SRCs) and those qualified in Oncology.

Of the 1,761 hospitals evaluated in the PNASS, 80 were excluded for not answering (NA) more than 10% of all the items ($NA > 10$). A total of 16 hospitals that did not have information in DATASUS that made it possible to

calculate the occupancy rate, mean hospitalization time and mean HA value indicators were also excluded; therefore, 1,665 hospitals (94.5%) remained in the study. The chi-square test was applied to compare the distribution of the hospitals included and excluded from the study, having verified that there was no significant difference between the groups, at a 0.05% level.

The main object of this study is Block 1 of the PNASS survey, which evaluates Organizational Management of the Health Services. The clipping of this study assesses the following criteria: Contract Management; Planning and Organization; Information Management; People Management; and Organizational Model.

Each criterion has 6 verification items, which are considered as follows in the PNASS methodology: 2 Indispensable (I), 2 Necessary (N) and 2 Recommended (R). In total, they correspond to a set of 30 items, whose answers are always dichotomous (YES or NO).

The dependent variable of this study (outcome) consists in the hospitals' performance in the Organizational Management Block. This variable was measured based on the answers given by each hospital to all 30 verification items. The verification items are detailed in the PNASS Notebooks, available in PNASS: National Program for the Evaluation of Health Services (saude.gov.br).

The Organizational Management Performance of each hospital was calculated by assigning a value of 1 (one) to the YES answers and 0 (zero) to the NO answers, applying weighted weights and considering the relative importance of the verification items as follows: the Indispensable items received a weight of 3 (value equal to 25); the Necessary items received a weight of 2 (value equal to 16.66); and the Recommended items received a weight of 1 (value equal to 8.33).

Initially, the hospitals' performance in each of the 5 criteria was calculated based on the sum of the values found. The Organizational Management Performance final score for each hospital was calculated based on the performance mean across all 5 criteria. The hospitals were divided into 3 performance ranges, based on the calculation of the first, second and third quartiles: Range 1 - Low performance, classified from 46.67 to 68.33; Range 2 - Average performance, classified from 68.33 to 83.33; and Range 3 - High performance, classified above 83.33.

The independent variables defined for the analysis were retrieved from the database of the National Registry of Health Institutions (*Cadastro Nacional de Estabelecimentos de Saúde*, CNES) and are as follows:

- According to the Ministry of Health's classification, the **Hospital Size** was categorized as small (up to

49 beds), average (from 50 to 150 beds), large (from 151 to 500 beds), and extra capacity (over 500 beds).

- The procedures' **Complexity Level** was categorized into 8 levels, with 8 as maximum complexity and 1 as minimum complexity.

- The **Type of Management** refers to the definition of which manager the hospital has a contract/agreement with and is regulated by, being responsible for the registration, scheduling, authorization and payments for the services provided to the SUS, and can be Municipal, State or Dual Management.

- The **Administrative Sphere** corresponds to the sphere to which the health institution is directly subordinated, and can be public (federal, state, and municipal) or private (private institutions or non-governmental organizations and related facilities).

The hospital indicators analyzed come from the DATASUS Hospital Admission System (*Sistema de Internação Hospitalar*, SIH) database, having linked the PNASS database according to the name of the hospital and the number registered in the CNES. Based on both databases, an association was verified between the hospitals' Organizational Management performance and the hospital performance indicators, namely:

- **Hospital Occupancy Rate:** it is the percentage ratio between the number of patients/day and the number of beds/day in a given period of time, considering for calculation of the beds/day in the denominator the beds installed and that are in the hospital's register, including the blocked beds and excluding the extra beds;

- **Mean Hospitalization Time:** it is the relationship between the total patients/day and the total of patients that exited the hospital in a given period of time, including the death cases. It represents the mean time (in days) that the patients remained hospitalized;

- **Mean HA Value:** it considers the total HA value divided by the number of hospitalizations in the same period.

Descriptive Analysis

A descriptive analysis was performed to characterize the hospitals that took part in the PNASS study. The percentage of verification items to which the hospitals answered YES and NO was also analyzed.

Depending on the hospitals' performance in the Organizational Management block, the mean position, minimum value and maximum value measures were estimated, as well as the standard deviation as a dispersion measure and quartile distribution for each of the variables

of interest. A frame analysis of the hospitals by performance ranges was also performed.

The association between the performance of the hospitals' Organizational Management and the Occupancy Rate, Mean Hospitalization Time and Mean HA Value indicators was carried out through a descriptive data analysis, considering the position and dispersion measures, also analyzing the coefficient of variation and 95% confidence interval.

Principal Components Analysis

Principal Component Analysis (PCA) was used to verify the dependence relationship among the Contract Management, Planning and Organization, Information Management, People Management and Organizational Model variables. PCA was also used to obtain a reduction in the number of variables into a score that soundly explains variability of the original data, called Principal Component.⁶

A covariance matrix was chosen to calculate the principal components, as the five variables under study have the same scale and do not present any discrepancy in the variance values. The eigenvalues, eigenvectors and total variance of this matrix were calculated. The explanation percentage of each component was calculated with Formula 1. The correlation between the components and the original variables was calculated with Formula 2.

Formula 1

$$\frac{\lambda_j}{\sum_{i=1}^p \lambda_i}$$

Formula 2

$$r_{\hat{Y}, X_1} = \frac{\hat{e}_{ji} \sqrt{\hat{\lambda}_j}}{\sqrt{s_{ii}}}$$

Adjusted Logistic Regression Model

The adjusted logistic regression model was estimated to verify the study variables that best explain Organizational Management Performance. The selection criteria to choose the best set of variables in the logistic regression model were as follows: Statistically Significant Variables (p-value<0.1); Variance Inflation Factor (VIF), to detect the association between explanatory variables; Hosmer-Lemeshow test, to test the quality of the explanation fit; and Akaike's Information Criterion, to measure the quality of a statistical model.

Ethical aspects

Regarding the ethical aspects, there was no need for submission to any Research Ethics Committee, as the study was conducted using the public domain secondary database, without nominal identification and in compliance with Decree No. 7,724 of May 16th, 2012, and Resolution No. 510, of April 7th, 2016.

RESULTS

A total of 1,665 hospitals were analyzed, distributed as follows: 41% in the Southeast region, 26% in the Northeast, 18% in the South, 7% in the North; and 6% in the Midwest. Regarding the number of beds, 66% of the hospitals evaluated, that is, most of the hospitals, have between 50 and 150 beds, being classified as average-sized hospitals; 29% are large hospitals, that is, between 150 and 500 beds; and 3% are extra-capacity hospitals, with more than 500 beds. The small-sized hospitals, with up to 50 beds, only represented 2% of this sample. Regarding the hospitals' Complexity Level, it was verified that 53% were Level 8, 22% were Level 7, 23% were Level 6 and 24% were Levels 1 to 6. Regarding the Type of Management, 60% of the hospitals were municipal, 24% were state-managed and 16% were state-managed/municipal. For the Administrative Sphere, it was identified that 52% are private and 48% are public, distributed as follows: 24% municipal; 21% state; and 3% federal (Table 1).

The Organizational Management Performance score obtained the following mean values when analyzed by region: hospitals in the South region had a performance score of 70.7 and in the Southeast it was 68.4 (best performers), while the Midwest had 57.5 and the Northeast and North regions had 56.2 and 52.9, respectively. In relation to the number of beds, the hospitals with more than 500 beds presented an average performance of 85.2; those with 151 to 500 beds scored 75.5; those with 50 to 150 beds scored 58; and the hospitals with 0 to 49 beds scored 50.5. This shows that the larger the size, the better the performance in the Organizational Management Block. Regarding the Complexity Level, performance scores of 70, 62.1 and 47.4 were verified for the hospitals with Complexity Levels 8, 7 and 1 to 6, respectively. In relation to the Type of Management, the state-managed hospitals reached a mean performance of 69, those with dual management (state-managed/municipal) obtained 62.7 points and those of municipal management scored 61.9. For the Administrative Sphere, it was identified that the Federal Public hospitals obtained a mean performance of 73.9; whereas it was 68.3 for the Private ones, 66.7 for the State Public, and 49.9 for the Municipal Public (Table 1).

Table 1 - Characterization and Organizational Management Performance of the hospitals according to region, number of beds, complexity, management and administrative sphere, 2015 and 2016 PNASS, Brazil

Characterization of the hospitals			Performance of the hospitals	
	N	%	MEAN	STANDARD DEVIATION
Region				
Midwest	108	6%	57.5	25.6
Northeast	439	26%	56.2	24.7
North	125	7%	52.9	25.9
Southeast	695	41%	68.4	22.1
South	298	18%	70.7	20.7
Number of beds				
0-49	31	2%	50.5	21.9
50-150	1105	66%	58	23.8
151-500	485	29%	75.5	19.6
500+	44	3%	85.2	15.9
Complexity level				
Levels 1 to 6	404	24%	47.4	27.4
Level 7	367	22%	62.1	24.1
Level 8	894	53%	70	21.9
Type of management				
Municipal	989	60%	61.9	24.4
State-managed	403	24%	69	22.9
State-managed/Municipal	273	16%	62.7	23
Administrative sphere				
Private	857	52%	68.3	21
Municipal Public	397	24%	49.9	25.3
State Public	356	21%	66.7	24.2
Federal Public	55	3%	73.9	18.1

Source: Database of the 2015-2016 National Program for the Evaluation of Health Services (PNASS), Brazil.

Regarding the Organizational Management Performance evaluation presented in Table 2, the hospitals presented in each PNASS criterion, on average, 77.59 performance in the Information Management criterion, 61.96 in People Management, 61.71 in Contract Management, 61.64 in Organizational Model, and 56.45 in Planning and Organization. The hospitals obtained an overall mean of 63.83 and a standard deviation of 24.01% in Organizational Management Performance. The first performance quartile was from 0 to 46.67, the second was from 46.68 to 68.33 and, in the third quartile, performance scores from 68.33 to 100 were verified (Table 2). Based on the quartile calculation, the hospitals were classified into 3 performance bands, with 52% of the hospitals classified as low performance, 24% as average performance, and 23% as high performance.

The first component of the Principal Components Analysis presented an explanation percentage of the total variance of 67.04%, being a component with high power to explain variability of the original data. The first and second components account for 77.24% of the total data variation. The PCA shows that all the random variables are strongly correlated to the hospitals' Organizational Management Performance, with the Planning and Organization variable having the highest correlation (0.88), followed by Contract Management with 0.80, Organizational Model with 0.85 and People Management with 0.79, while the lowest correlation is the Information Management variable, with 0.67 (Table 3).

Results of the Indicators

The evaluation of the Occupancy Rate of SUS beds stratified by hospital size shows that, in all variables, the hospitals with more than 150 beds had a higher Occupancy Rate than those with less than 150 beds. Regarding the Region of the Country, the hospitals with more than 150 beds presented the following occupancy rates: Southeast (71%), North (71%), Northeast (69%), South (69%), and Midwest (67%).

In relation to the Complexity Level, the hospitals with more than 150 beds and Complexity Level 8 had an occupancy rate of 71%, whereas it was 67% for those of Level 7 and 65% for Levels 1 to 6. Regarding the administrative Sphere, the occupancy rates of the hospitals with more than 150 beds were as follows: 79% for Municipal Public, 75% for State Public, 65% for Federal Public and 65% for Private hospitals. In the analysis by Management, the hospitals with more than 150 beds presented the following

Table 2 - Organizational Management Performance of the hospitals according to the 2015 and 2016 PNASS evaluation criteria, Brazil

Evaluation Criterion	Mean	1 st quartile	2 nd quartile	3 rd quartile	Standard Deviation	Coefficient of Variation
Contract Management	61.71	41.67	66.67	91.67	31.05	50%
Planning and Organization	56.45	25.00	58.33	91.67	35.29	63%
Information Management	77.59	58.33	83.33	100.00	22.76	29%
People Management	61.96	41.67	66.67	83.33	27.60	45%
Organizational Model	61.64	41.67	66.67	91.67	30.42	49%
Total	63.83	46.67	68.33	83.33	24.01	38%

Source: Database of the 2015-2016 National Program for the Evaluation of Health Services (PNASS), Brazil.

Table 3 - Correlation between the Organizational Management components and the Total Explained Variance as per the Principal Components Analysis - 2015 and 2016 PNASS, Brazil

Principal Component	Contract Management	Planning and Organization	Information Management	People Management	Organizational Model	Eigenvalue	Total Explained Variance	Accrued
Comp1	0.80	0.88	0.67	0.79	0.85	2,959.13	67.04%	67.04%
Comp2	-0.53	0.32	-0.03	-0.14	0.19	450.35	10.20%	77.24%
Comp3	0.25	0.33	-0.34	-0.37	-0.27	422.07	9.56%	86.80%
Comp4	-0.10	0.09	-0.34	0.46	-0.23	294.47	6.67%	93.47%
Comp5	0.06	-0.10	-0.56	-0.03	0.34	288.25	6.53%	100.00%

Source: Database of the 2015-2016 National Program for the Evaluation of Health Services (PNASS), Brazil.

occupancy rates: State/Municipal Management, 70%; State Management, 72%; and Municipal Management, 69% (Table 4).

It is noticed that the hospitals with more than 150 beds from the South region presented the best mean hospitalization time. For Complexity Levels 7 and 8, the hospitals present mean hospitalization times of 6.19 and 6.44 days, respectively, a better result than those of complexity 1 to 6, which presented a very high mean hospitalization time: 15.8 days. It is noted that the private hospitals with more than 150 beds presented the best mean hospitalization time for the patients (5.98 days), while the federal hospitals of the same size have a result of 7.68 days. Regarding the type of management, in the hospitals with more than 150 beds with State/Municipal management,

the results were 5.74 hospitalization days, in municipal hospitals it was 6.44 days, and in state-managed hospitals it was 7.35 days (Table 4).

The Mean HA Value per region highlights that the hospitals in the South have a Mean HA Value higher than the other regions (R\$ 1,874), followed by those in the Southeast (R\$ 1,776), Northeast (R\$ 1,768), Midwest (R\$ 1,735) and North (R\$ 1,432) (Table 4).

The hospitals of Complexity Level 8, which have more than 150 beds, presented a mean HA value of R\$ 1,874, those of Complexity Level 7 presented R\$ 1,076, and the hospitals of complexity levels 1 to 6 presented R\$ 1,280. In relation to the administrative sphere, the private hospitals with more than 150 beds stood out with a Mean HA Value of R\$ 2,129, while the federal hospitals presented a

Table 4 - Occupancy Rate, Mean Hospitalization Time and Mean HA Value according to region, complexity, administrative sphere and management, stratified by hospital size according to 2015 and 2016 PNASS, Brazil

Variable	Occupancy rate				Mean hospitalization time			Mean HA value			
	Hospital size	n	Mean	Confidence Interval	Mean	Confidence Interval	Mean	Confidence Interval			
Region											
Midwest	0-150 beds	68	44%	38%	50%	4.44	3.82	5.05	1,298	876	1,721
	>150 beds	40	67%	61%	73%	6.36	5.08	7.64	1,735	1,230	2,239
Northeast	0-150 beds	329	42%	40%	45%	4.26	3.95	4.57	764	667	860
	>150 beds	109	69%	65%	73%	6.83	6.32	7.35	1,768	1,555	1,981
North	0-150 beds	91	48%	41%	54%	4.38	3.85	4.92	656	570	741
	>150 beds	35	71%	64%	77%	7.28	6.12	8.44	1,432	1,085	1,779
Southeast	0-150 beds	450	49%	47%	52%	5.43	4.95	5.90	886	780	991
	>150 beds	246	71%	69%	74%	6.90	6.31	7.48	1,776	1,568	1,985
South	0-150 beds	199	46%	44%	49%	5.01	4.48	5.55	837	750	924
	>150 beds	98	69%	66%	72%	5.69	5.25	6.12	1,874	1,683	2,064
Complexity Level											
Levels 1 to 6	0-150 beds	390	36%	34%	38%	4.46	4.03	4.89	560	519	601
	>150 beds	13	65%	50%	80%	15.80	8.12	23.40	1,280	839	1,721
Level 7	0-150 beds	307	49%	46%	52%	4.73	4.29	5.17	675	635	714
	>150 beds	61	67%	61%	72%	6.19	5.07	7.31	1,076	974	1,177
Level 8	0-150 beds	440	54%	52%	56%	5.34	4.98	5.70	1,225	1,087	1,363
	>150 beds	454	71%	69%	72%	6.44	6.19	6.70	1,874	1,738	2,009
Administrative Sphere											
Private	0-150 beds	597	45%	43%	47%	4.48	4.20	4.75	938	859	1,018
	>150 beds	259	65%	63%	67%	5.98	5.45	6.50	2,129	1,918	2,341
Municipal Public	0-150 beds	327	41%	38%	44%	4.14	3.85	4.44	550	521	578
	>150 beds	72	79%	75%	83%	6.51	5.88	7.13	1,091	1,004	1,178
State Public	0-150 beds	200	59%	55%	62%	7.24	6.37	8.11	1,057	834	1,279
	>150 beds	155	75%	72%	78%	7.49	6.93	8.06	1,455	1,316	1,594
Federal Public	0-150 leitos	13	61%	47%	75%	5.18	4.32	6.04	1,005	744	1,266
	>150 beds	42	65%	61%	70%	7.86	7.13	8.59	1,841	1,484	2,198
Management											
Municipal	0-150 leitos	694	45%	43%	47%	4.50	4.24	4.76	807	746	868
	>150 leitos	296	69%	66%	71%	6.44	6.07	6.81	1,811	1,627	1,995
State-managed	0-150 leitos	234	56%	53%	58%	6.20	5.46	6.94	1,007	815	1,199
	>150 leitos	168	72%	70%	75%	7.35	6.60	8.09	1,627	1,456	1,797
State-managed/ Municipal	0-150 leitos	209	40%	38%	43%	4.63	4.19	5.08	808	687	928
	>150 leitos	64	70%	65%	75%	5.74	5.03	6.46	1,930	1,697	2,162

Source: Data from the Hospital Information System (*Sistema de Informação Hospitalar, SIH*) - DATASUS²⁴

value of R\$ 1,841, the state-managed hospitals presented R\$ 1,455 and the municipal hospitals reached R\$ 1,091. Concerning the Management variable, the hospitals with state and municipal management (dual) and more than 150 beds presented a better Mean HA Value (R\$ 1,930) than those with Municipal management (R\$ 1,811) and State management (R\$ 1,627) (Table 4).

Adjusted Logistic Regression Model

The following variables were kept in the adjusted logistic regression model: Region, Management, Hierarchical Level, Number of Beds, and Occupancy Rate in SUS Beds. The Administrative Sphere categorical variable was excluded, as well as the Mean Hospitalization Time and Mean HA Value continuous variables. The variables excluded were considered variables without major significance in relation to the hospitals' performance. The

analysis of the adjusted logistic regression model showed that the statistically significant variables (p -value <0.05) that actually explain Organizational Management Performance are the South (p -value <0.004) and Southeast (p -value <0.002) regions, Hierarchical Levels 7 (p -value <0.042) and 8 (p -value <0.022), hospital size with more than 150 beds (p -value $<4.49E-10$) and bed occupancy rate (p -value $<9.87E-09$). It is noted that the Municipal Management variable (p -value <0.004) negatively explains the performance of the hospitals evaluated, given the test statistics of -2.893 (Table 5).

According to the Organizational Management Performance explanation, the hospital size with more than 150 beds and bed occupancy rate variables are more robust, and the South and Southeast region variables also have a strong explanation factor. The hospitals' Complexity Levels 7 and 8 have lower explanation power.

Table 5 - Organizational Management Performance of the hospitals according to the Adjusted Logistic Regression Model, PNASS, 2015-2016, Brazil

Coefficient	Estimate	Standard Error	Test Statistics	p-value
Intercept	-3.135	0,357	-8.787	<2E-16
Midwest Region (Reference)				
Northeast Region	0.111	0.307	0.361	0.718
North Region	-0.058	0.378	-0.153	0.879
Southeast Region	0.888	0.285	3.111	0.002
South Region	0.886	0.307	2.883	0.004
Occupancy Rate in SUS beds	0.017	0.003	5.733	9.87E-09
Hierarchical Level - Up to Level 6 (Reference)				
Hierarchical Level - Level 7	0.444	0.218	2.037	0.042
Hierarchical Level - Level 8	0.47	0.205	2.295	0.022
Management - State-managed (Reference)				
Management - State-managed/Municipal	-0.166	0.2	-0.834	0.404
Management - Municipal	-0.414	0.143	-2.893	0.004
Hospital size - Up to 150 beds (Reference)				
Hospital size - More than 150 beds	0.879	0.141	6.236	4.49E-10

DISCUSSION

The study assesses the results of the evaluation of 1,655 hospitals in Brazil based on the PNASS. The study evaluated the Organizational Management Block, consisting of 30 verification items distributed into 5 criteria (Contract Management; People Management; Information Management; Planning and Organization; and Organizational Model), which comprised an evaluation score. The mean performance score was 63.83 (Table 2). In the logistic regression analysis, performance was positively associated with the following: Hospital size – better performance

for the hospitals with more than 150 beds; Hierarchy Levels 7 and 8; hospitals in the South and Southeast regions; and, negatively, with municipal management (Table 5).

The results show that most of the hospitals evaluated require an improvement in their actions related to Organizational Management, considering that 52% were classified as low performers for not meeting the PNASS criteria and only 23% of the hospitals had their performance classified as high.

When the hospitals' performance in each criterion was evaluated, as can be seen in Table 2, median results were

observed, with performance scores close to 60 for the Contract Management, Planning and Organization, People Management and Organizational Model criteria; and, in the Information Management criterion, the hospitals obtained the best evaluation, with a performance score equal to 77. This result points out deficiencies in all hospital management areas, indicating the need for hospitals to improve their organizational management by fully implementing the criteria and tools presented by the PNASS.

It was identified that the main gaps for improving hospital management include the need to formalize the contractualization instrument with the SUS, as well as to monitor and achieve the goals agreed upon in this management contract. Of the hospitals evaluated, 34% have no Formal Contractualization Instrument (*Instrumento Formal de Contratualização*, IFC); in other words, they have no contractual rules for the provision of services or the transfer of financial resources, as recommended in Ordinance No. 3,410 of December 30th, 2013, and evaluated in the PNASS.⁷

These results highlight the importance of the contractualization process for health management as a way to enhance the qualification of service provision. Among the potentialities mentioned it was possible to verify definition of responsibilities and quantitative and qualitative goals among managers and service providers, in order to guarantee better quality in health care. This also contributes to better application of financial resources, transparency and adequacy of hospital services.⁸

In the Planning and Organization criterion, which presented a performance score of 56.45 (the lowest among the criteria), it was verified that the main gaps refer to the lack of institutional strategic planning. Aligned with budget planning, in the scope of hospital organization, strategic planning directs the institution towards its objectives, foresees goals, anticipates results and creates the planning culture,⁹ being essential for the desired results to be achieved.¹⁰ In addition to Strategic Planning, the hospital dynamics requires Budget Planning, given its significant complexity and variety of material, human and technological resources that require large investments for their maintenance.¹¹ Hospital care is currently facing increasing assistance costs, mainly justified by aging of the population and by diseases with increasingly expensive treatment options, leading to constant rises in healthcare costs and ratifying the need to plan.¹²

In the People Management criterion, the low performance is in line with the insufficiency or nonexistence of job and career plans that stimulate workers' permanence with financial incentives or individual and/or collective

awards, also impacting on the hospitals' management performance. Having strategies for valuing and retaining professionals is important to minimize turnover and preserve the professionals' knowledge, in addition to stimulating professional development in order to qualify the processes and the care provided.

Finally, another important gap observed in this Block was the absence of a more participative and democratic management through the creation of Management Collegiate Boards and Councils with the participation of professionals, users and managers and periodic and frequent meetings. In the hospitals, these collective participation forums, more than a mere bureaucratic-administrative arrangement, should be thought of as an institutional device that assumes a strongly political character, constituting themselves as spaces for shared and transparent decisions.¹³

With regard to the Information Management criterion having presented better results, it is considered that the items evaluated refer to practices that are more consolidated in the hospitals when compared to the other items. The "The National Registry of Health Institutions is up to date" item was the one that obtained the highest number of YES answers. It is possible to associate this high compliance level with the fact that reception of SUS prescriptions from the hospitals is tied to updating of the CNES, with the possibility of suspension of the transfer of financial resources due to out datedness and inconsistencies in the CNES.¹⁴

The evaluation of the hospitals' Organizational Management Performance according to the Region, Management, Administrative Sphere, Hierarchical Level and Number of Beds variables presented important points for discussion. The distribution per region points to certain concentration of hospitals in the Southeast and South regions, indicating regional inequality in relation to access to hospital care and therapeutic and diagnostic technologies. The distribution of hospitals should be based on the conformation of regional arrangements that equate the number of hospitals to the health care needs, with a balanced distribution of human resources, adequate diagnostic support and beds based on the regional epidemiological profile. For this purpose, it is necessary to make use of information and computerization, cost control, increase efficiency, guarantee access and completeness, incorporate primary prevention into the care process, relate to specialized care, integrate the public and private sectors, and incorporate physicians in problem-solving.¹⁵

Regarding the Administrative Sphere, although the federal public hospitals only represent 3% of the hospitals evaluated, they stand out with the best Organizational

Management Performance. It is worth mentioning the National Program for Restructuring Federal University Hospitals (*Reestruturação dos Hospitais Universitários Federais*, REHUF) here, as it directed improvements to the hospitals, which may have reflected in improved management.¹⁶

It is important to discuss that hospitals with municipal management represent 60% of those evaluated and are the ones that presented the lowest performance mean values. The logistic regression analysis validates this result, showing the negative effect of municipal management on performance of the hospitals. This result indicates that, despite the quantitative advance in the decentralization process of health services and actions in the SUS, interventions are still required to qualify the organizational management of hospitals under municipal management. Municipalization exerts a direct impact on the performance of health services, as it involves issues related to the management contract, funding, lack of comprehensive care networks, low political and institutional sustainability, and problems in permanent staffing.⁸

The analysis of the results corresponding to the Occupancy Rate, Mean Hospitalization Time and Mean HA Value indicators stratified by hospital size leads us to relevant reflections on efficiency of the hospitals. The Occupancy Rate stratified by hospital size signals low occupancy, even for hospitals with more than 150 beds. It is important to point out that in no analysis did the mean occupancy of the hospitals reach the 80% rate recommended by the Ministry of Health. The Occupancy Rate results show opportunities for improvement in the internal and external management of beds since, in the current context, with high demand for beds and overcrowding in emergency rooms, it is not appropriate for hospitals to have idle beds. To improve this internal management, within hospitals, several authors advocate the creation of an Internal Regulation Center (*Núcleo Interno de Regulação*, NIR), whose primary function would be to promote efficient and rational use of hospital beds, as well as to implement protocols with admission criteria, defining the care profile to facilitate allocation of the right patient to the right bed. In addition to that, they mention the importance of strengthening the inclusion and articulation of the hospitals with the Health Care Network (HCN) to adapt the number and profile of patients referred to these hospitals¹⁷, in addition to guaranteeing care continuity and integrality.

The results of the mean hospitalization time indicator that draw more attention is that the low-complexity hospitals (hierarchy levels 1 to 6) presented a very high mean hospitalization time (15 days), which can be related both to

problems related to good management and to insufficient technological and care resources for diagnosis and treatment, thus prolonging the patients' hospitalization time. To adapt the bed utilization time, the care level offered must be appropriate to the patients' condition, as well as to their criticality classification and complexity.¹⁸

The lowest mean hospitalization times are in the private and public municipal hospitals with more than 150 beds (5.98 and 6.51 days, respectively), indicating greater efficiency in the treatment provided to the patients. A study by Raffa, Malik and Pinochet associates the lowest mean hospitalization time with the hospitals that have the best bed management practices and performance in the patient discharge processes.¹⁹

The mean HA value for the hospitals with more than 150 beds was R\$1,696.36; in other words, this is the mean value that the hospitals receive for each inpatient. The results also showed that private hospitals that have SUS beds have a Mean HA value 25% higher than public hospitals, which can be interpreted as a reflection of better management of their billing process. This shows that public hospitals have gaps in processes and structure that, once adapted, can boost hospital revenues. A study shows the mapping of the billing process of a large private hospital and highlights that the billing process efficiency goes through computerization and investment in account auditing.²⁰ This study also points to the relationship between scale and efficiency, as the variables related to hospital size, occupancy rate and complexity level are the ones that most explain the hospitals' Organizational Management Performance. In other words, hospitals with more than 150 beds, better bed occupancy rates and complexity levels 7 and 8 have better Organizational Management Performance. Higher efficiency levels in hospitals associated with a higher number of beds were also evidenced in the studies by Almeida Botega, Andrade & Guedes²¹; Chen, Hwang & Shao²² and La Forgia & Couttolenc,²³ who also observed better efficiency levels for larger hospitals.

This research highlights the importance of the instrument used; however, it notes that some advances are still required in the PNASS, such as the following: publicizing the results of the second and third evaluative instruments, not made available by the MS; returning the results to the institutions evaluated; including qualitative items in the evaluation instrument; and, mainly, continuity of the PNASS evaluations as a mechanism to institutionalize evaluation in the SUS.

CONCLUSION

The study analyzing PNASS data concludes by the association between better hospital performance and higher hospital complexity, larger size, and hospital management performance, as well as the negative effect of municipal management on performance of the hospitals.

The study also evidenced important gaps in the hospitals' Organizational Management regarding the PNASS criteria, indicating the need for hospitals to implement actions in search of compliance with the criteria evaluated by the PNASS and an effective improvement in hospital management performance. It is noted that 52% of the hospitals were classified as low performers.

Furthermore, the study points to the relationship between scale and efficiency, considering that hospitals with more than 150 beds have the best bed occupancy rates, higher complexity in their admissions, and better Organizational Management performance. In addition to that, the study reinforces the regional inequality found in the hospital area, with a concentration of hospitals in the South and Southeast regions both in quantitative and qualitative terms, showing the need to deepen the diagnosis corresponding to the organizational management of municipal hospitals, given the weaknesses pointed out in this study.

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