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RESEARCH ARTICLE (ORIGINAL)

Local health units: A vertical integration model of health care

Unidade local de saúde: Um modelo de integração vertical dos cuidados de saúde

Unidad local de salud: un modelo de integración vertical de los cuidados de salud

João Ricardo Miranda da Cruz [1]
https://orcid.org/0000-0002-4316-481X

Susana Rodríguez Escanciano [2]
https://orcid.org/0000-0001-5910-2982

Ana Belén Casares Marcos [2]
https://orcid.org/0000-0002-5842-4637

Maria Helena Pimentel [3,4]
https://orcid.org/0000-0002-0930-7469

[1] Northeast Local Health Unit - Bragança Hospital Unit, Bragança, Portugal

[2] University of Leon, Faculty of Law, Vergazana Campus, Leon, Spain

[3] Polytechnic Institute of Bragança, Santa Apolónia Campus, Bragança, Portugal

[4] Health Sciences Research Unit: Nursing (UICISA: E), Nursing School of Coimbra, Coimbra, Portugal

Corresponding author
João Ricardo Miranda da Cruz
E-mail: j_r_cruz@sapo.pt

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Abstract

Background: The local health unit (*Unidade Local de Saúde* - ULS) model embodies the vertical integration of health care services, bringing together different levels of care within a single entity and under the same management.

Objective: To analyze the ULS organizational model and its potential health and economic gains.

Methodology: This is an exploratory study involving five ULSs located in Portugal's northern and inland areas. The data analyzed focused on citizens' access to health care, quality of care, productive efficiency, and economic and financial performance from 2015 to 2018. The Portuguese Health Regulation Authority (ERS) and the Central Administration of the Health System (ACSS) provided the data for analysis.

Results: Considering the ACSS and ERS data analysis, there seems to be evidence that the ULS organizational model does not translate into economic and health gains.

Conclusion: ULSs were created to allow a better interconnection between the different levels of care. However, this organizational management model does not provide the added value theoretically expected.

Keywords: health institutions; administration of health services; models, organizational; quality of health care

Resumo

Enquadramento: As unidades locais de saúde (ULS) concretizam a integração de cuidados de natureza vertical, reunindo numa única entidade e com a mesma gestão, diferentes níveis de cuidados.

Objetivos: Analisar o modelo organizacional das ULS e os potenciais ganhos económicos e em saúde.

Metodologia: Estudo exploratório em que participaram cinco ULS que se localizam na zona norte e interior de Portugal. Os dados analisados incidiram sobre o acesso dos cidadãos aos cuidados de saúde, qualidade dos cuidados, eficiência produtiva e desempenho económico-financeiro, referentes ao período de 2015 a 2018. A fonte dos dados foi a Entidade Reguladora da Saúde (ERS) e a Administração Central do Sistema de Saúde (ACSS).

Resultados: Pela análise dos dados da ACSS e da ERS parece haver evidência de que o modelo organizativo em ULS não traduz na prática ganhos económicos e em saúde.

Conclusão: Na génese das ULS está o objetivo de criar uma melhor interligação dos diferentes níveis de cuidados, concluindo-se que este modelo de governação não aporta o valor acrescentado que teoricamente previa.

Palavras-chave: instituições de saúde; administração de serviços de saúde; modelos organizacionais; qualidade da assistência à saúde

Resumen

Marco contextual: Las unidades locales de salud (ULS) implementan la integración de los cuidados de carácter vertical reuniendo en una sola entidad y con la misma gestión diferentes niveles de cuidados.

Objetivos: Analizar el modelo organizativo de las ULS y los posibles beneficios económicos y sanitarios.

Metodología: Estudio exploratorio en el que participaron cinco ULS situadas en la zona del norte e interior de Portugal. Los datos analizados se centraron en el acceso de los ciudadanos a los cuidados de salud, la calidad de los cuidados, la eficiencia productiva y los resultados económico-financieros, para el período comprendido entre 2015 y 2018. La fuente de los datos fue la Entidad Reguladora de la Salud (ERS) y la Administración Central del Sistema de Salud (ACSS).

Resultados: A través del análisis de los datos de la ACSS y de la ERS, parece que hay pruebas de que el modelo organizativo de las ULS no se traduce en la práctica en beneficios económicos y sanitarios.

Conclusión: En la base de las ULS está el objetivo de crear una mejor interconexión entre los distintos niveles de cuidados, de lo que se concluye que este modelo de gobernanza no aporta el valor añadido que teóricamente prevé.

Palabras clave: instituciones de salud; administración de servicios de salud; modelos organizacionales; calidad de atención de salud

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Introduction

The issue of health care integration has become very relevant in recent years, particularly in developed countries, whose populations are more and more aged, resulting in an increase of chronically ill patients. These populations have high demand standards and xpect to live longer and with a better quality of life (Raak et al., 2003), thus putting health systems under pressure. The general objective of this study is to analyze the Local Health Unit (*Unidade Local de Saúde - ULS*) organizational model and the economic and health gains resulting from care integration. This study's specific objectives are to understand the processes of care integration and the factors involved, explore care integration in Portugal, and analyze a set of care integration quality and efficiency indicators that allows examining the ULS organizational model. These indicators include citizens' access to health care, productive efficiency, and economic and financial performance.

Background

The demand for health care is currently influenced by several epidemiological, social, educational, technological, and demographic determinants.

The problems mentioned above summarize the ongoing demand for care and call for the general transformation of health systems governance. Health units are the fundamental structures of health systems and play a central and unequivocal role in responding to health systems' needs. Maximizing their management is crucial to provide a flexible and constantly adaptive response to the new emerging environments (Santana & Costa, 2008).

ULSs were created to be single entities fully responsible for the health status of a given population, effectively coordinating the different levels of care (primary, hospital, and long-term care) with a high level of efficiency, quality, and user satisfaction. ULSs are expected to benefit the users living in their areas of influence (Entidade Reguladora da Saúde [ERS - Portuguese Health Regulation Authority], 2011) in their access to health care.

The ERS (2015, p. 7) defines the ULS model as the

> vertical integration of care due to bringing together different levels of care in a single entity and under the same management. Thus, the organization of different providers originates a single entity responsible for the health status of a given population. By integrating the delivery and management of all services and levels of care, this entity seeks to improve the interconnection of primary health care with hospital care and, ultimately, with other types of care, namely long-term care, through vertical integration.

The Matosinhos ULS was created in 1999, and the North Alentejo ULS was established in 2007, followed by three other units, the High Minho ULS, the Guarda ULS, and the Low Alentejo ULS. The Castelo Branco ULS was created in 2009, followed by the Northeast ULS in 2011 and the Coastal Alentejo ULS in 2012.

Considering the 2011 Census, the population covered by ULSs exceeded 1,176,266, 11% of 10,555,853 people living in Portugal.

The health systems' stakeholders have realized the importance of health care integration as deeper levels of care integration improve the performance indexes of health organizations.

Moreover, care integration initiatives can elicit more adequate responses to the new challenges posed by the expected evolution of the health market's supply and demand characteristics (Lopes et al., 2014).

Research question

What real gains have ULSs brought regarding citizens' access to health care, quality of services, productive efficiency, and economic and financial performance?

Methodology

This quantitative and exploratory study includes five ULSs (the High Minho, the Matosinhos, the Guarda, the Castelo Branco, and the Northeast) with different sociodemographic and geographic backgrounds. The High Minho and the Matosinhos ULSs are located in the northern coastal area of Portugal, covering a younger population with fewer comorbidities. Due to the geography, this population has easier access to health services and, therefore, to care. The Castelo Branco ULS, the Guarda ULS, and the Northeast ULS are in the interior of Portugal and are attended by an older population with more comorbidities, less educated, and more geographically dispersed. As a result, this population has more difficulty accessing health services.

The data sources for this study were the Portuguese Health Regulation Authority (ERS) and the Central Administration of the Health System (ACSS), and the period considered ranged from 2015 to 2018. The researcher requested the data by letter to the ERS, focusing on the number of complaints and their reasons per ULS studied. The data requested to the ACSS focused on: the citizens' access to health care, considering the numbers of physicians and nurses, and the mean waiting time for scheduling and performing elective surgeries; the productive efficiency, considering the mean length of hospital stay, the total number of inpatients, the total number of hospital admissions, and the total number of emergency cases handled; and the economic and financial performance, considering the medication and pharmaceutical costs, and the mean time for supplier payments.

The research data were collected in two phases. First, in January 2017, the data were requested to the ERS and the ACSS. Second, in January 2020, authorization was asked to identify the ULS to disclose the data provided by the ACSS.

Results

The results presentation follows the data aggregation into four dimensions: citizens' access to health care, productive

efficiency, quality of care, and economic and financial performance. The results will serve to evaluate the performance of the studied ULSs in each of these dimensions. Identifying the set of performance benchmarks and indicators - and the means for their measurement - to monitor health workforces (Organização Mundial de Saúde, 2008) is a critical component of national health services' performance. Thus, the indicator analyzed allows assessing the health professionals' coverage of the resident population, reflecting the capacity of the studied ULSs to respond to the populations' possible needs.

The analysis of Table 1 allows observing that, except for the Northeast ULS, all the other ULSs increased their response capacity in this indicator during the 2015-2018 period. The High Minho ULS had an increase of 34 physicians, from 377 physicians in 2015 to 411 in 2018. This increase relates positively to the ability to promote a qualified and differentiated clinical and medical response. The number of nurses also followed the trend observed in the number of physicians. Considering both hospital care and primary health care, four of the ULSs studied increased their response capacity due to the growth in the number of nurses. The exception was the Castelo Branco ULS, where nurses decreased from 362 (in 2015) to 356 (in 2018).

Table 1

Total number of physicians and nurses per ULS studied (2015-2018)

	High Minho ULS	C. Branco ULS	Guarda ULS	Matosinhos ULS	Northeast ULS
	Physicians/ Nurses	Physicians/ Nurses	Physicians/ Nurses	Physicians/ Nurses	Physicians/ Nurses
2015	377/618	150/362	192/470	387/620	201/434
2016	391/653	153/358	197/495	397/613	205/457
2017	392/681	155/367	202/526	400/618	204/470
2018	411/675	158/356	205/543	414/637	203/480

Note. ULS = Local Health Unit.
Adapted from "Central Administration of the Health System, 2018".

Regarding the mean waiting time indicator for scheduling and performing elective surgeries within the Portuguese Integrated Management System of the Waiting List for Elective Surgery (SIGIC; Table 2), a first analysis revealed that users' mean waiting times stabilized during the 2015-2018 period. The Matosinhos ULS had the most significant reduction in mean waiting times, from 4.5 months in 2015 to 3.7 months in 2018. On the other hand, the Northeast ULS recorded the worst result with an increase in waiting time of 0.7 months (3.14 in 2015 and 4.14 in 2018). The High Minho ULS, the Guarda ULS, and the Castelo Branco ULS observed, in 2018, a slight variation in the mean waiting times of 3.2 months, 3.3 months, and 2.7 months, respectively.

Table 2

Mean waiting time at each ULS for scheduling and performing elective surgeries within the scope of the SIGIC (2015-2018)

Operating ULS	WT mean Op (months) (Hosp) 2015	WT mean Op (months) (Hosp) 2016	WT mean Op (months) (Hosp) 2017	WT mean Op (months) (Hosp) 2018
Matosinhos ULS	4.51	4.7	4.65	3.79
High Minho ULS	3.22	3.94	3.21	3.24
Guarda ULS	3.26	3.53	3.2	3.37
Castelo Branco ULS	2.8	2.42	2.52	2.7
Northeast ULS	3.44	3.87	4.04	4.14

Note. WT = waiting time; Op = operation; Hosp = hospital; ULS = Local Health Unit.
Adapted from "Central Administration of the Health System, 2018".

Considering the quality of care assessed through the number of complaints, as shown in Table 3, the number of complaints submitted to the ERS increased in four ULSs. Although the increase was less marked in three, the Matosinhos ULS had a sharp increase (920 complaints in 2015 to 1663 complaints in 2018). On the contrary, the High Minho ULS followed a downward trend in this indicator (933 complaints in 2015 to 635 in 2018). It is worth noting that the High Minho ULS, with the highest population density of the five ULSs under analysis, had in 2018 a complaints number very similar to the Guarda ULS and the Castelo Branco ULS, the health units with lower population density.

Table 3

Number of complaints per year of submission to the ERS (2015-2018)

Local Health Unit (ULS)	2015	2016	2017	2018
Guarda ULS	362	328	312	411
Castelo Branco ULS	369	457	527	513
Matosinhos ULS	920	959	1669	1663
High Minho ULS	933	760	777	635
Northeast ULS	287	311	283	371
Total/Year	2871	2815	3568	3593

Note. ULS = Local Health Unit.
Adapted from "Health Regulatory Entity, 2018".

Regarding the most common complaint topics (Table 4), the focus on the user was the most common, with 22.6% at the Guarda ULS, 23.3% at the High Minho ULS, and 25.4% at the Northeast ULS. The second most common complaint topic concerned the difficulties in health care access.

Table 4

Most common complaint topics (2015-2018)

Focus on the user	Issues regarding the level of humanization of health services, including daily practices, internal procedures, users' rights, publicity, and interpersonal relationships.
Health care access	Issues relating to difficulties in obtaining health care.

Note. Adapted from "Health Regulatory Entity, 2018".

One of the aspects that have hindered the efficiency assessment of the ULS care integration model is that, historically, health care delivery has been less oriented towards disease prevention and more towards responding to acute, episodic disease. Thus, the performance measures and methodologies traditionally used are consistent with this fragmented health care delivery. This is evident in the high number of inpatient admissions observed in Table 5.

This trend is reversed by the gradual decrease in inpatient admissions in the ULSs during the period under study. The Guarda ULS recorded the most significant reduction (1154) in inpatients (from 9698 in 2015 to 8544 in 2018). The Castelo Branco ULS registered a decrease of 385 patients, the Matosinhos ULS of 913 patients, the High Minho ULS of 442 patients, and the Northeast ULS of 800 patients.

Table 5

Total number of inpatient admissions per ULS (2015-2018)

Studied ULS	2015	2016	2017	2018
Guarda ULS	9698	9383	9031	8544
Castelo Branco ULS	8136	8155	7850	7751
Matosinhos ULS	16210	16356	15780	15297
High Minho ULS	17994	18110	17539	17552
Northeast ULS	11467	11211	10734	10667

Note. ULS = Local Health Unit
Adapted from "Central Administration of the Health System, 2018".

Table 6 presents the values regarding the mean length of hospital stay in the five ULSs, revealing the increase in the mean length of hospital stay. In 2015, the Guarda ULS had a mean length of hospital stay per patient of 9.2 days, the Castelo Branco ULS of 7.3 days, the Matosinhos ULS of 7.2 days, the High Minho ULS of 7.2 days, and the Northeast ULS of 9.0 days. The ULSs with the highest increase in the mean length of hospital stay were the Guarda and the Northeast, increasing by 1.4 days and 1.3 days, respectively. The increase in the remaining ULSs was considered insignificant (0.3 days in the Castelo Branco ULS, 0.2 days in the Matosinhos ULS, and 0.1 days in the High Minho ULS).

Table 6

Mean length of hospital stay per ULS (2015-2018)

Studied ULS	2015	2016	2017	2018
Guarda ULS	9.2	9.6	9.9	10.6
C. Branco ULS	7.3	7.3	7.6	7.6
Matosinhos ULS	7.2	7.1	7.1	7.4
High Minho ULS	7.2	7.3	7.4	7.3
Northeast ULS	9.0	9.3	10.2	10.3

Note. ULS = Local Health Unit.
Adapted from "Central Administration of the Health System, 2018".

The number of emergency cases handled, presented in Table 7, progressively increased in all the ULSs. Although the growth was less significant in Guarda, Castelo Branco, and Matosinhos, the High Minho ULS had the most significant increase (8803) in emergency cases (96512 cases in 2015 to 105315 in 2018). The Northeast ULS recorded 74340 emergency cases in 2015, and 77161 in 2018, revealing an increase of 2821 cases.

Table 7

Total number of emergency cases handled (2015-2018)

Studied ULS	2015	2016	2017	2018
Guarda ULS	60610	63489	51737	61360
Castelo Branco ULS	63363	67300	64536	63091
Matosinhos ULS	85545	90741	90373	87158
High Minho ULS	96512	100264	102298	105315
Northeast ULS	74340	77261	74240	77161

Note. ULS = Local Health Unit.
Adapted from "Central Administration of the Health System, 2018".

Considering the economic and financial performance, the inpatient medication and pharmaceutical costs (presented in Table 8) gradually rose in four of the five ULSs (the Guarda ULS was excluded due to lack of data). Although not very significantly, the Castelo Branco ULS experienced a progressive increase (3,000,000€ in 2015, approximately 2,000,000€ in 2016, over 3,000,000€ in 2017, and close to 3,500,000€ in 2018). The Matosinhos ULS revealed a steady increase of roughly 1,000,000€ per year, similar to the High Minho ULS, and the Northeast ULS increased around 40% in four years.

Table 8

Inpatient medication and pharmaceutical costs per ULS (2015-2018)

Inpatient medication consumption	2015	2016	2017	2018
Guarda ULS	not available	not available	not available	6,298,152.2€
C. Branco ULS	3,071,328.9€	2,174,419.04€	3,332,789.65€	3,543,340.3€
Matosinhos ULS	8,947,346.5€	9,439,173.07€	10,475,868.1€	11,285,561.36€
Alto Minho ULS	9,317,665.0€	10,552,372.9€	11,391,181.8€	11,295,551.25€
Northeast ULS	2,488,789.0€	2,356,605.80€	3,475,419.04€	4,631,817.15€

Note. ULS = Local Health Unit.
Adapted from "Central Administration of the Health System, 2018"

Concerning the mean time for supplier payments (Table 9), the mean number of days at the Castelo Branco ULS stood out due to its lower value among the five ULSs under study. In 2018, it was only 66 days. The remaining four ULSs presented a similar mean value for supplier payments. The Guarda ULS had a mean value of 200 days, the Matosinhos ULS of 218 days, the High Minho ULS of 171 days, and the Northeast ULS of 175 days.
In a more detailed observation and from a time perspective, from 2016 to 2018, only the High Minho ULS increased the mean time to pay suppliers, with an added 32 days (139 days in 2016 to 171 days in 2018). The remaining ULSs decreased the number of days, precisely 46 days in the Guarda ULS, 60 days in the Northeast ULS, and 103 days in the Matosinhos ULS.

Table 9

Mean time for supplier payments per ULS (2015-2018)

Mean Time for Payment	2016	2017	2018
Guarda ULS	246	274	200
C. Branco ULS	62	78	66
Matosinhos ULS	331	385	218
High Minho ULS	139	192	171
Northeast ULS	235	264	175

Note. ULS = Local Health Unit.
Adapted from "Central Administration of the Health System, 2018"

Discussion

According to Campos et al. (2009), geographical and social asymmetries in the distribution of human resources lead to inequities in access to services. Most governments have identified these asymmetries as a relevant and persisting problem, despite the several strategies adopted to solve it. In general, health care deficits caused by the lack of professionals primarily affect the poorest and most disadvantaged sections of the population. By analyzing the data regarding the number of physicians, four of the five ULSs recorded a growth in the number of these professionals, indicating an increase in the capacity to respond to the populations' needs for medical care. Although residual, four ULSs also recorded a rise in the number of nurses.

According to the ACSS (2017), the holistic vision provided by the vertical integration of care together with the transversal follow-up of users' entire pathway and the monitoring of the overall and transversal response times of the several levels of care increase the overall productivity of the National Health Service (*Serviço Nacional de Saúde* - SNS).

Waiting times can indicate organizational-type barriers to health care access due to poor resource planning and inefficient use of the existing capacity (Barua, 2012).

According to Barros (2009), waiting for health care always has negative results due to its impact on health, its economic nature, and the risk of adverse events in patients. Reducing the waiting times for surgery is one of the main objectives of the SIGIC. This system is considered "a vital change in the public discussion of waiting lists. Instead of presenting and discussing the numbers regarding the size of the waiting lists, we started discussing waiting times" (p. 342).

Regarding the mean waiting time for scheduling and performing elective surgeries within the scope of the SIGIC, the mean times in the ULSs stabilized. The Matosinhos ULS achieved the most significant reduction in mean waiting times, from 4.5 months in 2015 to 3.7 months in 2018. The Northeast ULS saw this indicator worsen with an increase of 0.7 months (3.14 in 2015 and 4.14 in 2018). In the High Minho ULS, Guarda ULS, and Castelo Branco ULS, the values regarding the mean waiting times for scheduling and performing elective surgeries were constant.

User complaints are an essential source of information and allow obtaining data regarding the functional problems of a health organization. Users, as active participants, are crucial for health units' operation and quality of care provided, as they identify issues, sometimes unnoticeable to the monitoring models used to detect anomalies (Reader et al., 2014). By analyzing the 2015-2018 data, the number of complaints submitted to the ERS against four ULSs increased. The High Minho ULS was the exception as it followed a downward trend in the number of complaints (933 in 2015 to 635 in 2018). On the other hand, the Matosinhos ULS registered an exponential increase (in 2015, it had 920 complaints, and in 2018, the number stood at 1663 complaints).

Evans et al. (2013) consider that the different health policies are clearly aimed at improving the interconnection between organizations and their distinct levels of care. The creation of vertically integrated organizations has sought to increase the quality of care and promote greater efficiency and user satisfaction.

The most common complaint topic was the "focus on the user." According to the ERS, it comprised issues related to the level of humanization of health services, including daily practices, internal procedures, users' rights, publicity, and interpersonal relationships (ERS, 2015).

The health care provided now focuses on users' specificities/ characteristics and pathologies, giving less relevance to the providers' needs (Ackerman, 1992). Byrne and Ashton (1999) add that the vertical integration of care encourages health institutions to emphasize health promotion and prevention rather than focusing only on disease treatment to improve patients' overall health status. Based on these authors' premise, it is worth discussing the data and their evolution regarding the total number of inpatient admissions, the mean length of hospital stay, and the total number of emergency cases handled. Data analysis shows that all ULSs decreased the number of inpatient admissions during the period under study, gradually reducing the number of inpatients. The mean length of hospital stay revealed differences between the ULSs. Nevertheless, the mean length of stay increase was transversal to all ULSs, with the number of days added as the only difference. Considering the data on the number of emergency cases in the ULSs, these progressively increased in all of them.

According to Santos (2015), many consider the vertical integration of care as a crucial organizational model to cope with the current economic pressures. Although there is no consensus regarding its advantages, this model is pointed out as an added value in reducing and containing health expenditure (p. 81).

The data analysis shows that in 2018 the Guarda ULS, the Matosinhos ULS, the High Minho ULS, and the Northeast ULS had very similar mean times of supplier payment. Considering the period from 2016 to 2018, only the High Minho ULS increased the mean time of supplier payment by 32 days. The Guarda ULS, the Matosinhos ULS, and the Northeast ULS decreased the number of days in the mean time for supplier payment. Considering the medication and pharmaceutical costs, four of the five ULSs in the study (excluding the Guarda ULS due to insufficient data) demonstrated a progressive increase in this economic and financial performance indicator over the four years under analysis, contrary to what the literature suggests. According to Santana and Costa (2008), healthcare integration presupposes an increase in economies of scale through the coordination of several levels of care.

This study is limited by the lack of data on the waiting time for scheduling and performing complementary diagnostics and therapeutic tests. Knowing these mean waiting times is a relevant indicator of citizens' access to health care. Many medical decisions are based on laboratory test results, which can be considered a highly cost-effective tool for diagnosis, prognosis, and prevention.

Conclusion

The results obtained from the ACSS and ERS data focused on citizens' access to health care, quality of care, productive

efficiency, and economic and financial performance. Their analysis allows inferring that the ULS organizational model has not brought the SNS the significant gains that it theoretically provides.

The data revealed that the mean waiting times for elective surgeries stabilized in all the ULSs. Thus, these results may point to a problem in citizens' access to health care. Regarding the quality of care, the number of complaints submitted to the ERS increased in all the ULSs. The most frequent complaint topic was the "focus on the user," concerning the services' level of humanization, including daily practices, internal procedures, and users' rights, among other issues.

The data regarding the mean length of hospital stay increased in all ULSs, only varying in the number of days. This suggests that the possible benefits of integrating the two levels of health care did not reduce hospital stay length. Thus, there is the need for greater integration and interconnection between professionals from different levels of care, leading to better follow-up and monitoring of their users' health status. For example, the surveillance and monitoring of chronic diseases would translate into a lesser aggravation of users' previous pathologies, reducing the need for hospital care or differentiated care and fewer days of hospitalization. Moreover, the increase in length of hospital stay, besides worsening the patient's general condition, will also impact economic and financial aspects, increasing the direct costs of care delivery in each ULS.

Considering the number of emergency cases handled, it was observed that their number progressively increased in every ULS under study. However, the vertical integration model of care was expected to significantly decrease this number due to the interconnection dynamics between primary health care and hospital care. Thus, these data lead to the understanding that the coordination between the different levels of care is deficient or incomplete.

Considering the economic and financial dynamics, inpatient medication and pharmaceutical costs increased during the four years under study.

Nevertheless, it is essential to state that all the conclusions presented above, based on the results under analysis, which are the product of inferences, do not exhibit an evident and definitive trend. Moreover, they cannot be extrapolated to institutions and periods not contemplated. It is also relevant to include the existence of disparities between the ULSs studied, which in reality lead to different levels of integration. These disparities had already been predicted and were not the focus of this research study.

Authors contributions

Conceptualization: Cruz, J. R.,
Data curation: Cruz, J. R., Pimentel, M. H., Escanciano, S. R., & Marcos, A. B.
Formal analysis: Cruz, J. R., Pimentel, M. H., Escanciano, S. R., & Marcos, A. B.
Writing - original draft: Cruz, J. R.,
Writing - analysis and editing: Pimentel, M. H., Escanciano, S. R., & Marcos, A. B.

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