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What has changed in hospital pharmaceutical services in a health region in Distrito Federal (Brazil) three years after the initial diagnosis?

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Abstract

Objective: To reevaluate the services of Hospital Pharmacy (HP) of two public hospitals in Distrito Federal (DF-Brazil) in a perspective of temporal comparison three years after the initial situational diagnosis. **Method:** A cross-sectional study was carried out involving two large general hospitals coordinated by the same superintendency of Health Department of the DF (SES-DF) and whose pharmaceutical services were evaluated at the end of 2016. Data were collected again in January 2020 and the HP were characterized as its area, functioning and human resources and evaluated considering structure and process indicators referring to managerial and assistance pharmaceutical services. Then, the HP were reevaluated by applying the scoring algorithm based on the identification of mandatory, non-mandatory and undesirable characteristics and the approximation percentages of service compliance were calculated and compared to the ideal. The HP were also evaluated for their support in risk management. **Results:** The scoring algorithm made it possible to verify that the two HP showed an improvement in the percentage of service compliance in relation to the ideal. In HP1, the percentage increase was in response to a greater presentation of mandatory items from the selection, information and teaching and research components. In HP2, distribution and management services weighed positively. There was also an important evolution in the perspective of activities to support risk management and patient safety. This general improvement occurred without a structural improvement and in the number of human resources in terms of the proportion of pharmacist per bed. **Conclusions:** The results suggest an improvement in services despite maintaining the inadequacy of the area and the number of pharmaceutical professionals and highlight the importance of adapting practices and constant monitoring of services with a view to making services more qualified and safer and having a positive impact on terms of adding value to the processes given the demands of internal and external actors.

Key words: health services research; pharmacy services; hospital, risk management.

O que mudou nos serviços farmacêuticos hospitalares em uma região de saúde do Distrito Federal (Brasil) após três anos do diagnóstico inicial?

Resumo

Objetivo: Reavaliar os serviços de Farmácia Hospitalar (FH) de dois hospitais públicos do Distrito Federal (DF-Brasil) em uma perspectiva de comparação temporal após três anos do diagnóstico situacional inicial. **MétodoS:** Estudo transversal envolvendo dois hospitais gerais de grande porte coordenados pela mesma superintendência da Secretaria de Saúde do DF (SES-DF) e cujos serviços farmacêuticos foram avaliados no final do ano de 2016. A segunda avaliação foi realizada em janeiro de 2020 e as FH foram caracterizadas conforme sua área, funcionamento e recursos humanos e avaliadas considerando indicadores de estrutura e processo referentes a serviços farmacêuticos gerenciais e assistenciais. Depois, as FH foram reavaliadas por meio da aplicação do algoritmo de pontuação a partir da identificação de características obrigatórias, não obrigatórias e indesejáveis e calculados percentuais de aproximação de cumprimento dos serviços em comparação ao ideal. As FH foram ainda avaliadas quanto ao seu apoio na gestão de riscos. **Resultados:** O algoritmo possibilitou verificar que as duas FH apresentaram melhora na porcentagem de cumprimento dos serviços em relação ao ideal. Na FH1, o aumento na porcentagem se deu como resposta a uma maior apresentação de itens obrigatórios dos componentes de seleção, informação e ensino e pesquisa. Na FH2 pesaram positivamente os serviços de distribuição e gerenciamento. Também houve evolução importante na perspectiva de atividades de apoio à gestão de riscos e segurança do paciente. Essa melhora geral se deu sem uma melhora estrutural e de quantidade de recursos humanos em termos de proporção de farmacêutico por leito. **Conclusões:** Os resultados sugerem melhora dos serviços apesar de manutenção da inadequação de área e de quantidade de profissional farmacêutico e remontam a importância de adequação das práticas e constante monitoramento dos serviços com vistas a tornar os serviços mais qualificados e seguros e que tenham impacto positivo em termos de agregar valor aos processos dadas as demandas de atores internos e externos.

Palavras-chave: avaliação de serviços de saúde; serviço de farmácia hospitalar; hospital, gestão de riscos.

Introduction

The hospital is an important Health Care Institution (HCI) in the context of Care Networks, which must adapt to the epidemiological, population and geographic peculiarities of the region where it is inserted and must be articulated with other health care points and with the support systems.[1]

Regardless of its classification, the quality of hospital care is the result of an inter-relation across services, among which the pharmaceutical ones stand out. These services involve a set of activities aimed at the rational, responsible and safe access and use of medications and must be integrated with the other health services, where adequate physical area, equipment and furniture, and trained human resources (HR) are essential.[2] These activities are carried out by the hospital pharmacy (HPh), which requires the pharmacists involved to exercise clinical, managerial and advisory functions related to activities in the care, administrative, economic, research and teaching contexts.[2]

The pharmaceutical services performed in the hospital context are subjected to evaluation, in order to assist in the decision-making process according to the complexity of the hospital in which the HPh is inserted.[3] This evaluation refers to the judgment of value considering structure (resources employed and their organization), process (services or goods produced) and results (performance of the services) in a panorama of verification of the level of adequacy to standardized criteria and standards.[4] In addition to that, the HPh is important from the point of view of risk management in the hospital environment, as it is responsible for the continuous and systematic monitoring of the process of using health technologies in the hospital setting.[5]

Evaluation of services is a recurrent theme in the context of management and it is essential that it is operationalized through systematized methodologies, seeking continuous improvement in assistance. In addition to the issue related to management and to the assistance provided, technological and infrastructure aspects are evaluated in an orderly and rational manner and standards are established in accordance with certifying agencies.[3,6,7]

Furthermore, the evaluation is essential for structuring or restructuring pharmaceutical services, including those related to risk management and quality management in health, so that they enable a situational diagnosis and, from this, interventions are proposed to expand the capacity of the public health sector management and the quality of the service provided.[3]

Despite the importance of the theme, there was lack of information regarding the evaluation of Brazilian hospital pharmaceutical services until the early 2000s, when the *Hospital Pharmacy Diagnosis Project in Brazil*[8] was carried out. In this project, structure and process indicators related to hospital pharmaceutical services performed in a sample of 250 Brazilian hospitals[8] were proposed, which evidenced the need for efficiency and professional qualification given the low compliance of most pharmaceutical services, regardless of the hospital's complexity. Other studies carried out years later, although local, brought similar data, such as the one by Penaforte et al. (2007) in a public hospital in São Paulo[9] and that by Silva et al. (2013) in a number of hospitals from Rio de Janeiro.[10]

In *Distrito Federal*, a first diagnosis of the hospital pharmacy services in the public system was conducted in 2016. The study showed that, of 15 HPhs in hospitals under the management of the local Health Secretariat, only four had good service compliance.[11] In addition to that, aspects related to the pharmacists' workload per bed and the existence of a staff qualification schedule were those that most influenced this result.[11]

The results found, the current demands related to the quality and safety of services and the use of health technologies and the internal organizational motivations of the local Health Secretariat were reflected in actions of the local Pharmaceutical Assistance Board (*Diretoria de Assistência Farmacêutica*, DIASF) in terms of proposing and implementing normative and organizational actions, especially in the last five years. Among the actions, the proposal of a training course for pharmacists and the elaboration of a guide of good practices for the pharmaceutical services developed in the hospital environment stands out.

Thus, the objective of this study was to evaluate the HPh services of two public hospitals in *Distrito Federal* (DF) – Brazil, from a perspective of a time comparison three years after the first situational diagnosis of the same services.

Methods

An analytical cross-sectional study was carried out involving two large-sized hospitals under the management of the DF Health Secretariat (SES-DF) belonging to the same health region of the DF, with health actions coordinated by a single superintendence. The data were collected using an instrument validated in the *Hospital Pharmacy Diagnosis Project in Brazil*[8], prepared in accordance with the current Brazilian health legislation. This instrument was applied to those responsible for the HPhs in January 2020 in the two hospitals whose pharmaceutical services were evaluated in terms of structure and process in November 2016.[11]

The instrument underwent a pre-test to verify its adequacy and had a part dedicated to the characterization of the hospital and another related to the HPhs themselves concerning the components of the logical model proposed in the aforementioned project.[8,12] The components foreseen were management, selection, scheduling, acquisition, storage and distribution of medications, information, pharmacotherapeutic follow-up (PhF), pharmacotechnics and teaching and research (T&R).[8]

As for the HPhs, they were characterized according to their area (11 areas were likely to be referred to: reception, dispatch, storage, handling of sterile products, quality control, drug distribution, outpatient dispensation, Medication Information Center [*Centro de Informação de Medicamento*, CIM], administrative, flammables and quarantine), operation and HR.

The data referring to the components of the logical model related to the hospital pharmaceutical services made it possible to carry out the normative evaluation of the HPhs considering validated structure and process indicators.[8,12] Subsequently, the HPhs were quantitatively evaluated through the application of scoring algorithms considering the presentation of the components and characteristics provided for in the normative evaluation.[12] The components could be mandatory or not, depending on the hospital complexity defined by hierarchical strata (HS) proposed in the study by Messeder (2005)[12] and it should be noted that the two hospitals evaluated fell into hierarchical stratum 3 (HS3), for which only the T&R component of the logic model was not mandatory.

Within each mandatory component, there were mandatory, non-mandatory and undesirable characteristics by the HPh, the first ones being presented in the table of results of the structure and process indicators in italics for differentiation. Thus, the algorithms predicted interdependence between the components and that the mandatory characteristics or even the justification for their absence and the presence of undesirable ones varied, so that, the more complex the hospital, the greater the requirements and the lower the acceptance of items not compatible with the complexity presented. If the HPh presented the mandatory characteristics for the non-mandatory components, these were considered in the score and the weights of the components for the final score were reorganized.[12]

The points of each HPh within the HS were obtained by adding up the score of the indicators weighted by component of the logical model and compared to an ideal score that corresponded to the maximum points that could be obtained for the HS defined in the first moment according to Messeder (2007) (for HS3, the maximum of points defined was 624.9).[13] The results were expressed as a percentage of approximation of service compliance in relation to the ideal, so that the HPh would present regular, average and good performance if it obtained percentages from 0% to 33.3%, from 33.4% to 66.6% and from 66.7% to 100%, respectively.[13] Such percentage was calculated for each HPh (global approximation percentage).

The HPhs were also evaluated according to validated indicators related to their support in risk management in the context of the hospitals where they were located. This component was based on the section referring to the medication use process of the document entitled *Safe Practices for Better Healthcare* of the American *National Quality Forum,*[14] focusing on the indicators brought in the document related to HPh activities. Strategies for the prevention of errors in the process of prescription, distribution, dispensation and administration of medications referred to by the Institute for Safe Medication Practices (ISMP) were also considered for the construction of this module.[15,16] This module also underwent a pre-test to verify its adequacy.

The items evaluated in the risk management component were the presence of a pharmacist during the pharmacy's opening hours, medication management, including Potentially Dangerous Medications (PDMs) and medications with similar spellings and sounds, as well as technical-managerial activities related to the distribution of medications, totaling 10 items. For the evaluation of this component, the percentage of presentation of the expected items in comparison to the ideal (presentation of all the items) was calculated, which enabled the classification of the HPhs in terms of support for risk management activities in regular, average and good compliance if they obtained percentages from 0% to 33.3%, from 33.4% to 66.6% and from 66.7% to 100%, respectively, as well as in the other components.[13]

Data analysis was conducted in a descriptive manner in terms of absolute numbers or frequencies. The research was approved by the Research Ethics Committee (*Comitê de Ética em Pesquisa*, CEP) of the Health Sciences School, University of Brasília – Brazil (opinion number 1511600) and by the CEP of the Foundation for Education and Research in Health Sciences of SES-DF (opinion number 1559785).

Results

Both HPhs provided technical-managerial and technical-assistance services. In 2020, the person responsible for the HPh at H1 (HPh1) before the SES-DF was a nursing technician, while in the HPh at H2 (HPh2) the person responsible was a pharmacist. The HPhs had an increase in the workload of pharmacists; however, in HPh1, the ratio of beds per pharmacist was increased (Table 1).

Table 1: General characterization of the hospitals and of the HPhs evaluated. Distrito Federal, 2020.

HPh	Year	Active beds	Pharmacists				Operation with pharmacist (h)	
			N	WL	N/ Active bed	WL/Active bed	Mon-Fri	WKD-Hol
1	2016	171	6	160	1:29	0.93h (56 min)	12	12
	2020	250	7	220	1:36	0.88h (53 min)	12	12
2	2016	168	4	120	1:42	0.7h (43 min)	10	0
	2020	161	5	160	1:33	1h (60 min)	12	0

WL: Workload (h); WKD: Weekend; Hol: Holiday; H: Hospital; h: hours; Mon: Monday; Fri: Friday.

Of the specific areas likely to be mentioned by those responsible for the HPhs evaluated, HPh1 started to have a reception area and a quarantine area in 2020, and HPh2, a quarantine area. Both HPhs continued having no shipping areas, handling of sterile products, quality control, outpatient dispensation, CIM and flammables area. Considering the specific areas the HPh had, none were mentioned by the respondents as adequate in 2020, while in 2016, the distribution and administrative areas in HPh1 and the administrative area in HPh2 were considered adequate.

The data on items and services presented by the HPhs obtained through the normative evaluation are shown in Table 2 in the form of indicators organized by component of the logical model. For differentiation, the mandatory items of the components for HS3 are in italics.

Both HPhs showed an improvement in the percentage of service compliance in relation to the so-called ideal for the HS to which the hospital belonged, and it is worth mentioning the status change from average to good in HPh2 in 2020 (Table 3). In HPh1, the percentage increase was a consequence of a greater presentation of mandatory items from the selection, information and T&R components, which, despite having items said to be non-mandatory for the HPh belonging to HS3, was accounted for since the HPh presented all the expected items according to the methodology. In HPh2, the distribution and management components weighed positively.

Since 2016, the hospitals had a Patient Safety Center (*Núcleo de Segurança do Paciente*, NSP) formally established and those responsible for both HPhs reported that the pharmacy service had supported or was aware of some action carried out by the NSPs of their hospitals both in 2016 and 2020. The indicator results related to the support of the HPhs in risk management within the hospitals where they were located are described in Table 4.

Table 2: Results of the structure and process indicators related to the pharmaceutical services in 2016 and 2020. Distrito Federal, 2020. (continued)

Component	Indicator		HPh1		HPh2	
			2016	2020	2016	2020
Schedule logistics	1	Was there a schedule for supplying the selected medications in the HPh?	Yes	Yes	Yes	Yes
	2	Did the HPh have all the indicator medications available in stock?	No	No	No	No
	3	Did the HPh use the ABC curve for the schedule (in case the purchase quantity was specified)?	No	No	No	No
	Presentation percentage of the items referring to the component		33.3	33.3	33.3	33.3
Acquisition logistics	4	Did the hospital have a record of suppliers (in case of acquisition/purchase)?	Yes	No	Yes	CNI
	5	Was there any technical specification elaborated by the pharmacist for the purchase (in case of acquisition/purchase)?	Yes	Yes	Yes	Yes
	6	Was there any technical specification for the purchase (in case of acquisition/purchase)?	Yes	Yes	Yes	Yes
	7	Did the pharmacist inform the purchase full specifications (in case of acquisition/purchase)?	No	No	No	No
	8	Did the hospital use a price database to monitor the purchases (in case of acquisition/purchase)?	CNI	Yes	CNI	Yes
	Presentation percentage of the items referring to the component		60.0	60.0	60.0	60.0
Storage logistics	9	Did the HPh have a stock control system in the CAF?	Yes	Yes	Yes	Yes
	10	Did the HPh have a computerized stock control system in the CAF (in case it had stock control)?	Yes	Yes	Yes	Yes
	11	Percentage of adequacy of the medication storage practices in the CAFb.	42.1	47.4	57.9	52.6
	12	Did the HPh have a record of the stock of medications corresponding to the physical count in the CAF?	No	No	Yes	Yes
	13	Percentage of indicator medications within their expiration datec.	100.0	100.0	100.0	100.0
	Presentation percentage of the items referring to the component		60.0	60.0	80.0	80.0
Distribution	14	Percentage of compliance with the good drug distribution practicesb.	52.9	47.1	88.2	76.5
	15	What distribution system is in place? (individualized – 1; collective – 2; mixed – 3; unit – 4)?d	3	3	2	3
	16	Did the HPh have any satellite pharmacy?	Yes	Yes	No	No
	Presentation percentage of the items referring to the component		66.7	66.7	33.3	66.7
Management	17	Did the HPh have a rules and procedures manual?	No	No	Yes	Yes
	18	Was the HPh formally included in the hospital's organizational chart?	Yes	Yes	Yes	Yes
	19	Did the hospital have an organizational chart?	Yes	Yes	Yes	Yes
	20	Was the HPh directly linked to the clinical area or general management?	Yes	Yes	Yes	Yes
	21	Did the HPh develop objective and goal planning on an annual or longer basis?	No	Yes	Yes	No
	22	Did the HPh have an annual or longer schedule for training human resources?	No	No	No	No
	23	Did the HPh have pharmacists with a lato or strictu sensu graduate course?	Yes	Yes	Yes	No
	24	Did the HPh have a pharmacist?	Yes	Yes	Yes	Yes
	25	Did the HPhs have IT resources for clinical activities?	No	Yes	No	No
	26	Did the HPh work with health products in addition to medications?	Yes	Yes	Yes	Yes
	27	Did the hospital pharmacist effectively participate in the NCIRAS?	Yes	Yes	No	Yes
	28	Did the hospital pharmacist effectively participate in the EMTN?	No	No	No	Yes
	Presentation percentage of the items referring to the component		58.3	75.0	66.7	66.7
Selection	29	Did the hospital have a CFT working regularly?	No	Yes	Yes	No
	30	Did the hospital have an up-to-date list of medications?	No	Yes	Yes	Yes
	31	Did the hospital have therapeutic protocols?	No	Yes	No	No
	32	Did the hospital have a pharmacotherapy form or guide?	No	Yes	No	No
	Presentation percentage of the items referring to the component		0.0	100.0	50.0	25.0
Pharmacotechnicsa	33	Did the HPh fraction medications?	Yes	Yes	Yes	Yes
	34	Did the HPh prepare non-sterile formulations?	No	No	No	No
	35	Percentage of adequacy of the conditions for fractionation and/or preparation of non-sterile medicationsb.	37.5	62.5	57.1	57.1
	36	Did the HPh prepare PN?	No	No	No	No
	37	Mean percentage of adequacy of the PN preparation conditions.	NA	NA	NA	NA
	38	Did the HPh prepare IV admixtures?	No	No	No	No
	39	Mean percentage of adequacy of the practice of preparing IV admixtures.	NA	NA	NA	NA
	40	Did the HPh prepare CT?	No	No	No	No
	41	Mean percentage of adequacy of the CT preparation conditions?	NA	NA	NA	NA
	42	Did the HPh contemplate quality control of non-sterile compounded and/or fractionated medications?	Yes	Yes	Yes	Yes
	Presentation percentage of the items referring to the component		28.5	28.5	28.5	28.5

Table 2: Results of the structure and process indicators related to the pharmaceutical services in 2016 and 2020. Distrito Federal, 2020. (conclusion)

Component		Indicator	HPh1		HPh2	
			2016	2020	2016	2020
Information	44	Did the HPh develop any formalized information activity?	No	No	No	No
	44.1	Mean percentage of fulfillment of requests for information on medications.	0.0	0.0	0.0	0.0
	45	Did the HPh develop educational activities with the patients?	No	No	No	No
	46	Did the HPh have at least tertiary information sources?	No	Yes	Yes	Yes
	Presentation percentage of the items referring to the component		0.0	33.3	33.3	33.3
Pharmacotherapeutic follow-up	47	Did the pharmacist participate in the clinical visit or make a specific visit?	Yes	Yes	No	No
	48	Were formal pharmaceutical consultations performed with hospitalized patients?	No	No	No	No
	49	Did the HPh have a pharmacotherapeutic form for hospitalized patients?	No	No	No	No
	50	Was there any therapeutic monitoring activity with hospitalized patients with participation of the HPh?	No	No	No	No
	51	Did the HPh formally carry out pharmacovigilance activities?	Yes	Yes	Yes	Yes
	Presentation percentage of the items referring to the component		40.0	40.0	20.0	20.0
Teaching and Research	52	Did the HPh offer programs or activities for professional training?	Yes	Yes	Yes	Yes
	53	Did any of the HPh members publish scientific papers?	Yes	Yes	No	No
	54	Did the HPh hold periodic scientific sessions?	No	Yes	No	Yes
	55	Did the HPh participate in research activities in the hospital?	No	Yes	No	No
	Presentation percentage of the items referring to the component		50.0	100.0	25.0	50.0

In italics: mandatory items for HS3; CAF (Central de Abastecimento Farmacêutico): Pharmaceutical Supply Center; CFT (Comissão de Farmácia e Terapêutica): Pharmacy and Therapeutics Committee; EMTN (Equipe Multidisciplinar de Terapia Nutricional): Nutrition Therapy Multidisciplinary Team; HPh: Hospital Pharmacy; IV: Intravenous; NA: Not Applicable; NCIRAS (Núcleo de Controle de Infecção Relacionada à Assistência à Saúde): Healthcare-Related Infection Control Center; PN: Parenteral Nutrition; CNI: Person responsible could not inform; CT: Chemotherapy; a: The Non Applicable items were not considered; b: It only scored if it had a percentage greater than 66.6; c: It only scored if all the medications were valid; d: It only scored if the mandatory distribution system for the HS was presented (mixed as a minimum).

Table 3: Reference algorithm of the components of the logical model and mandatory structure and process items/services presented by the HPhs with the score obtained. Distrito Federal, 2020.

Component	Item/Services												Score (items/services x weight)a			
	Mandatory				Non-mandatoryb				Undesirable				HPh1		HPh2	
	HPh1		HPh2		HPh1		HPh2		HPh1		HPh2					
	2016	2020	2016	2020	2016	2020	2016	2020	2016	2020	2016	2020	2016	2020	2016	2020
Logistics Schedule	1	1	1	1	-	-	-	-	-	-	-	-				
Logistics Acquisition	3	3	3	3	-	-	-	-	-	-	-	-	26x7 = 182	25x7 = 175	26x8 = 208	26x8 = 208
Logistics Storage	3	3	4	4	0	1	0	0	-	-	-	-				
Distribution	1	1	1	2	1	1	0	0	0	0	1	0	15.5x1.25 = 19.4	15x1.25 = 18.8	Canceled	15.5x2.25 = 34.9
Management	5	5	5	6	3	4	1	2	-	-	-	-	15.5x5 = 77.5	15x5 = 75	15.5x5 = 77.5	15.5x8 = 124
Selection	0	3	2	1	0	1	0	0	-	-	-	-	15.5x0 = 0	15x4 = 60	15.5x2 = 31	15.5x1 = 15.5
Pharmacotechnics	2	2	2	2	0	0	0	0	0	0	0	0	10.5x2 = 21	10x2 = 20	10.5x2 = 21	10.5x2 = 21
Information	0	1	1	1	0	0	0	0	-	-	-	-	8.5x0 = 0	8x1 = 8	8.5x1 = 8.5	8.5x1 = 8.5
Pharmacotherapeutic Follow-up	1	1	1	1	1	1	0	0	0	0	0	0	8.5x1 = 8.5	8x2 = 16	8.5x1 = 8.5	8.5x1 = 8.5
Teaching and Researchc	1	2	1	1	1	2	0	1	-	-	-	-	-	4x4 = 16	-	-
TOTALd	17	21	21	22	0	10	0	3	0	0	1	0	308.4 (49.3% of the ideal)	388.8 (62.2% of the ideal)	354.5 (56.7% of the ideal)	420.3 (67.2% of the ideal)
Classification													Average	Average	Average	Good

a: Weights defined according to Messeder (2005)12; b: It is only computed when the HPh presented all the mandatory items; c: Component not computed when the HPh did not present all the mandatory items; d: In relation to the ideal score given the HS (624.9).

Table 4: Results of the indicators related to the support provided by the HPhs in risk management in the scope of the hospitals where they were located in 2016 and 2020. Distrito Federal, 2020.

	Indicator	HPh1		HPh2	
		2016	2020	2016	2020
1	Availability of the pharmacist throughout the pharmacy's opening hours.	No	No	No	No
2	There is a protocol for the detection, registration and communication of medication errors in which the Pharmacy Service is involved.	No	No	No	No
3	There is a list of abbreviations, symbols and expression of doses associated with medication errors.	No	Yes	No	No
4	In the hospital, there are rules or protocols on the correct storage, conservation and replacement of medications in the wards/clinics.	No	No	No	No
5	In the hospital, there are rules or protocols on the correct storage, conservation and replacement of medications in the Pharmacy Service.	No	No	Yes	Yes
6	In the pharmacy service, there are rules or protocols on labeling and repackaging of medications in unit/individualized doses*.	No	Yes	No	Yes
7	There are procedures for the maintenance of stop cars.	No	No	No	Yes
8	There is a list of PDMs in the hospital.	No	Yes	Yes	No
9	There are rules on the administration of PDMs (maximum doses, duration, administration route, double-checking of dose calculations).	No	Yes	No	No
10.1	Percentage of beds with unit dose medication distribution (Monday to Friday/weekends and holidays).	0.0	0.0	0.0	0.0
10.2	Percentage of beds with individualized dose medication distribution (Monday to Friday/weekends and holidays)**.	34.5	74.0	0.0	29.2
Presentation percentage of the items referring to the component* **		0.0	40.0	20.0	30.0
Classification		Regular	Average	Regular	Regular

*HPh2 in 2016, the distribution system was collective; **Considering all beds, including those with individualized doses in the hospitals with a mixed distribution system; ***Considering 10 items, as no HPh had a unit distribution system; HPh: Hospital Pharmacy; PDMs: Potentially Dangerous Medications; N: Number.

Discussion

Three years after carrying out the situational diagnosis of the HPhs in the hospitals, important changes were observed in terms of structure and process in the pharmaceutical services. Hospital pharmaceutical services have technical particularities and good practice premises throughout the value chain to which medications and health products are subjected, in addition to their distribution at the place of consumption, referring to a discussion of safety in their use process[17].

All activities and processes need technical and sanitary control and, therefore, require the presence of a qualified professional, in order to guarantee the integrity of the products and the safety of those who use them. Thus, from a legal point of view, there are important problems, such as the fact that the person responsible for HPh1 is not a pharmacist and that this person is not present throughout the entire operating hours of the HCI, the latter aspect evidenced since 2016[18].

Also regarding HR, there was an increase in the number of pharmacists, although not in proportion to the increase in active beds, which was evident when analyzing the data from HPh1, whose ratio of pharmacists per bed decreased in comparative terms considering the increase in beds. Even so, HPh1 presented an improvement in the percentage of service compliance in relation to the so-called ideal, despite not having changed its general status. In HPh2, there was an increase in the pharmacist's workload without much variation in the number of active beds, which may have positively influenced the HPh status change for good compliance of the activities when compared to the ideal.

It is worth highlighting the activities proposed and carried out by the local DIASF, which may have influenced the results. The results of the 2016 situational diagnosis referred to a statistically significant association between workloads of professionals per bed and the existence of a schedule for HR training and good compliance of hospital pharmaceutical services,[11], which corroborates this discussion regarding the results obtained scarcely more than three years later. Other national and international studies also refer to this potential association[19–22], with evidence that a high level of capacity related to management activities is directly reflected in the execution of other pharmaceutical services.[23]

In structural terms, however, the lack of adequacy of the areas was apparently maintained, with no proportional evolution when compared to the improvement in the services. In addition to that, this supports the discussion that the HPh areas are often not conceived in terms of facilities and locations for the effective and global execution of pharmaceutical services, and it is important to note that the HPh infrastructure is closely related to its functionality from the perspective of quality and safety[2,24].

As for the pharmaceutical services, the components related to logistics (schedule, acquisition and storage) did not present significant changes in the HPhs, and it is worth considering the low proportion of items related to the schedule maintained three years after the initial diagnosis. Specifically, the ABC curve, despite corresponding to a classic and widely used system for defining acquisition and storage logistics strategies,[25] was not used in 2016 nor three years later.

The data related to logistics are of concern regarding the continuity of the managerial pharmaceutical services, since the schedule, when properly carried out, tends to ensure the timely, safe and efficient availability of medications and health products with less risk of stockouts with a positive impact on patient care,

regardless of the context.[26] A US study evaluating inventory policies in a HPh service evidenced that logistical adjustments in the stock management policy to ensure drug availability had an important relationship and impact on patient safety.[27]

Regarding the distribution service, despite still having a mixed distribution system, HPh1 increased the proportion of beds with an individualized distribution system and, in HPh2, there was a change in the system from collective to mixed. This last result influenced the change in the status from average to good compliance of the pharmaceutical services in HPh2, given that, in 2016, this component had its score canceled, since the collective system is considered undesirable for HPhs in HS3. It is also worth acknowledging the effort of the team at the reassessed HPhs, since the structural and resource needs increase proportionally in relation to the complexity of the systems,[28], which are unmet.

The distribution service corresponded to one of those with the greatest impact in terms of service compliance, being essential for the timely availability of the medication and for safety in its use process.[20,29–31] The results corroborate the literature, which points to an improvement in the performance of hospital pharmaceutical services as a result of changes in the medication distribution system.[21,32]

The selection component presented different results between the HPhs, possibly as a reflection of the regular functioning of the Pharmacy and Therapeutics Commission (*Comissão de Farmácia e Terapêutica*, CFT) at HPh1. It is to be noted that there is a central CFT in the local Health Secretariat, which does not preclude local activities regarding the decision to incorporate medications into the local care practice, given the different contexts observed within a health care network.[25] Problems related to this service were also observed by Santana et al. (2018) in a study conducted with 12 hospitals from Sergipe.[25] In addition, its great importance in terms of the continuity of the pharmaceutical services and, in broader terms, rationality and safety in its use, must be considered.

T&R activities, although not mandatory for HS3, had a considerable evolution. These results are of great importance from a practical point of view, considering that good compliance of the pharmaceutical services serves as a basis for better training of HR, which are prone to adequate standards of practice,[10,23] and that the use of the service for training human resources is an interesting alternative for the conduction of pharmaceutical services and for the production of information and knowledge that would support the improvement of the current practices, as evidenced in the literature.[33,34]

As for the risk management support activities, in comparative terms, HPh1 started to present four items in 2020, which increased its percentage of item presentation and changed its classification from regular to average service compliance. HPh2 also started to present items that are important from a risk management perspective, which increased the percentage of items presented, despite not changing the status regarding the compliance of related services.

The results referring to risk management, added to those related to the distribution of medications, allow inferring that there was an important evolution in the perspective of supporting risk management and patient safety in the HPhs evaluated, despite still being below the ideal and the evidence provided, for example, in an evaluative study of good safety practices in the process of medication use in two public hospitals in Minas Gerais.[35] It is also worth mentioning the potential repercussion in practical terms of the global patient safety challenge by the World Health Organization proposed in 2017, entitled "Medication without harm",[36] which expanded the local discussion on the theme.

Hospital pharmaceutical services must be understood from a holistic perspective in order to identify risk factors and vulnerabilities to avoid problems that lead to a context of difficult access and availability of medications when required.[37] To this end, continuous improvement is essential in a scenario that shows a need to create value for the claimant, whether an internal client, such as members of the multidisciplinary team, or external clients, that is, the patient, their family members and/or caregivers.

In this sense, the actions proposed and carried out over the time elapsed between the two evaluations were potentially favorable to the improvement in the services. However, there is still large space for improvement, and it is fundamental to implement new actions and to strengthen those already performed that exerted a positive impact and, for this, continuous evaluation is of utmost importance. In addition, there is a need for concrete continuing education actions at the local level with a view to the development and/or reorientation of processes. This is evidenced when considering, for example, that the HPhs continued not presenting annual or longer schedules for training human resources.

Likewise, similar results were found by Silva *et al*. (2013)[10], who applied a similar methodology in the evaluation of hospital pharmacies in Rio de Janeiro. The study also pointed out problems such as lack of planning by objectives and goals, selection of medications that did not meet the real demands, inadequate stock control and non-compliance with good medication distribution practices. Nascimento *et al.* (2013)[38], using data collected during the *Hospital Pharmacy Diagnosis Project in Brazil* in the early 2000s, evidenced similar problems and that greater compliance of the pharmaceutical services was associated with variables related to management, to the pharmacist's time of dedication to the service and to the higher training level.

Thus, the results allow stating that, despite local data, the approach referring to continuous training concerning a management model beyond the quantitative approach in terms of HR is broad and applicable to any context that enables health actions aimed at care quality and safety.

The results must be analyzed considering the limitations inherent to the methodology and to the fact that the type of study adds the subjective bias related to data collection. The pilot test carried out and the fact that the interviews were conducted by a researcher with practical knowledge of the evaluated services may have reduced this bias. In addition to that, the questionnaire used dates back to a context in which the pharmaceutical services were still essentially focused on the managerial level, although the addition of the module on risk management refers to reflection on the intersection between managerial and care aspects and impacts related to safety in the care process. Despite these aspects, the data support the temporal validity of the data collection instrument (used in the 2000s, 2016 and 2020), applicability and usefulness given the continuous need to re-evaluate practices and processes related to hospital pharmaceutical services.

Conclusion

The data evidenced an improvement in the services despite the maintenance of inadequacy of the area and in terms of the number of pharmacists. In addition to that, they make clear the need to adapt the practices and to constantly monitor the services in a scenario of continuous improvement. This context must involve issues of professional qualification and structural adequacy, aimed at making the services more qualified and safer and that have a positive impact in terms of adding value to the processes given the demands of internal and external actors.

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Collaborators

RFL devised the original project and MRBS collected the data. RFL and MRBS analyzed and interpreted the data. MRBS and RFL wrote the article. RSS and BMCSA performed a critical review and relevant adjustments to the intellectual content.

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Conflict of interest statement

The authors declare no conflict of interest regarding this article.

References

1. Mendes EV. As redes de atenção à saúde. Cien Saude Colet. 2010;15(5):2297-2305. DOI:10.1590/S1413-81232010000500005.
2. Sociedade Brasileira de Farmácia Hospitalar. Padrões Mínimos Para Farmácia Hospitalar e Serviços de Saúde. 3 ed. São Paulo: Sociedade Brasileira de Farmácia Hospitalar; 2017.
3. Santos JA, Limberger JB. Indicadores de avaliação da assistência farmacêutica na acreditação hospitalar. Rev Adm em Saúde. 2018;18(70). DOI:10.23973/ras.70.71.
4. Donabedian A. The seven pillars of quality. Arch Pathol Lab Med. 1990;114(11):1115-1118.
5. Lima RF, Toledo MI, Silva PHD, *et al.* Avaliação de serviços farmacêuticos na gestão de risco no uso de medicamentos em hospitais públicos do Distrito Federal, Brasil. Vigil sanit debate. 2020;8(2):84-93. DOI: 0.22239/2317-269x.01415.
6. Mendes VLS, Luedy A, Tahara ÂTS, *et al.*. Política de Qualidade, Acreditação e Segurança do Paciente em Debate. Rev Baiana Saúde Pública. 2017;40:232-249. DOI:10.22278/2318-2660.2016.v40.n0.a2678.
7. Bouças E, Martins TR, Futuro DO, *et al.* Acreditação no âmbito da assistência farmacêutica hospitalar: uma abordagem qualitativa de seus impactos. Physis Rev Saúde Coletiva. 2018;28(3):1-20. DOI:10.1590/s0103-73312018280317.
8. Osorio-De-Castro CGS, Castilho SR. Diagnóstico da Farmácia Hospitalar no Brasil. Rio de Janeiro: Escola Nacional de Saúde Pública, Fundação Oswaldo Cruz; 2004.
9. Penaforte TR, Forste AC, Simões MJS. Evaluation of the performance of pharmacists in terms of providing health assistance at a university hospital. Clinics (Sao Paulo). 2007;62(5):567-572. DOI:S1807-59322007000500006.
10. Silva MJS, Magarinos-Torres R, Oliveira MA, *et al.* Avaliação dos serviços de farmácia dos hospitais estaduais do Rio de Janeiro, Brasil. Cienc Saude Coletiva. Cien Saude Colet. 2013;18(12):3605-3620. DOI:10.1590/S1413-81232013001200017.
11. Lima RF, Toledo MI, Silva PHD, *et al.* Evaluation of pharmaceutical services in public hospital pharmacies of Federal District - Brazil. Farm Hosp. 2018;42(3). DOI:10.7399/fh.10941.
12. Messeder AM. Avaliação de Estrutura e Processo de Serviços de Farmácia Hospitalar segundo nível de Complexidade do Hospital [dissertação]. Escola Nacional de Saúde Pública, Fundação Oswaldo Cruz, Rio de Janeiro, 2005.
13. Messeder AM, Osorio-de-Castro CGS, Camacho LAB. Projeto Diagnóstico da Farmácia Hospitalar no Brasil : uma proposta de hierarquização dos serviços. Cad Saude Publica. 2007;23(4):835-844. DOI: 10.1590/S0102-311X2007000400011.
14. The National Quality Forum. Serious Reportable Events in Healthcare 2006 Update: A Consensus Report.; 2007. Available in: https://www.qualityforum.org/Publications/2007/03/Serious_Reportable_Events_in_Healthcare–2006_Update.aspx. Accessed on: May 21 2021.
15. Instituto para Práticas Seguras no Uso de Medicamentos. Programa Nacional de Segurança do Paciente: Indicadores para Avaliação da Prescrição, do Uso e da Administração de Medicamentos – Parte II. 2016;5(1):1-9.
16. Instituto para Práticas Seguras no Uso de Medicamentos. Programa Nacional de Segurança do Paciente: Indicadores para Avaliação da Prescrição, do Uso e da Administração de Medicamentos – Parte I. 2016;5:1-6.
17. Conselho Federal de Farmácia. Resolução nº 679, de 21 de novembro de 2019. Avalieable in: https://www.in.gov.br/en/web/dou/-/resolucao-n-679-de-21-de-novembro-de-2019-241336577#:~:text=Disp%C3%B5e%20sobre%20as%20atribui%C3%A7%C3%B5es%20do,sujeitas%20a%20controle%20especial%20e. Accessed on: 21 mai. 2021.
18. Brasil. Lei n.13.021, de 8 de agosto de 2014. Available in: http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2014/lei/l13021.htm. Accessed on: May 21 2021
19. Farias DC, Araujo FO. Gestão hospitalar no Brasil: revisão da literatura visando ao aprimoramento das práticas administrativas em hospitais. Cien Saude Colet. 2017;22(6):1895-1904. DOI:10.1590/1413-81232017226.26432016.
20. Silva PL, Castilho SR, Ferraz CVG. Análise dos resultados da aplicação de práticas gerenciais na logística de estoque de uma farmácia hospitalar. Rev Adm Hosp e Inovação em saúde. 2017;14(2):14-31. DOI: 10.21450/rahis.v14i2.4088.
21. Pedersen C, Schneider P, Scheckelhoff D. ASHPh nation-

al survey of pharmacy practice in acute care settings: dispensing and administration--1999. Am J Heal Syst Pharm. 2012;69:768-785. DOI: 10.1093/ajHPh/57.19.1759.

22. Pollard SR, Clark JS. Survey of health-system pharmacy leadership pathways. Am J Heal Pharm. 2009;66(10):947-952. DOI:10.2146/ajHPh080186.

23. Rutter V, Wong C, Coombes I, et al. Use of a general level framework to facilitate performance improvement in hospital pharmacists in Singapore. Am J Pharm Educ. 2012;76(6). DOI:10.5688/ajpe766107.

24. Osorio-de-Castro CGS, Luiza VL, Castilho SR, *et al*. Assistência Farmacêutica: Gestão e Prática para Profissionais de Saúde. Riode janeiro: FIOCRUZ; 2014.

25. Santana RS, Cardoso GC, Lobo IMF, *et al*. Medicamentos e hospitais públicos: o impacto da implantação de comissões de farmácia e terapêutica. Rev Bras Farmácia Hosp e Serviços Saúde. 2019;9(2):1-6. DOI:10.30968/rbfhss.2018.092.006.

26. Figueroa L, Aguirre S, María W, *et al*. Análisis de la Logística Hospitalaria aplicada en las Entidades de Salud de Nivel 3 y 4 en la ciudad de Barranquilla. 2016;21(4):307-31.

27. Gebicki M, Mooney E, Chen SJG, *et al*. Evaluation of hospital medication inventory policies. Health Care Manag Sci. 2014;17(3):215-229. DOI: 10.1007/s10729-013-9251-1.

28. Pinto VB. Armazenamento e distribuição: o medicamento também merece cuidados. In: Uso Racional de Medicamentos: Fundamentação em Condutas Terapêuticas e nos Macroprocessos da Assistência Farmacêutica. 2016;1(12):1-7.

29. Abdelaziz H, Richardson S, Walsh K, *et al*. Evaluation of STAT medication ordering process in a community hospital. Pharm Pract (Granada). 2016;14(2):1-5. DOI:10.18549/PharmPract.2016.02.647.

30. Rabuñal-Álvarez MT, Calvin-Lamas M, Feal-Cortizas B, *et al*. Indicadores de calidad en el proceso de almacenamiento y dispensación de medicamentos em un Servicio de Farmacia Hospitalaria. Rev Calid Asist. 2014;29(4):204-211. DOI:10.1016/j.cali.2014.03.005.

31. Rabuñal-Álvarez MT, Calvin-Lamas M, Feal-Cortizas B, *et al*. Acciones de mejora en los procesos de almacenamiento y dispensación de medicamentos en un Servicio de Farmacia Hospitalaria. Rev OFIL. 2014;25(1):29-32.

32. Schumock GT, Ursan ID, Crawford SY, *et al*. Pharmacy practice in small and rural hospitals in Illinois- 2011. Am J Heal Pharm. 2013;70(13):1144-1152. DOI:10.2146/ajHPh120437.

33. Kostagiolas PA, Aggelopoulou VA, Niakas D. A study of the information seeking behaviour of hospital pharmacists: Empirical evidence from Greece. Health Info Libr J. 2011;28(4):302-312. DOI:10.1111/j.1471-1842.2011.00963.x.

34. Balen RM, Jewesson PJ. Pharmacists computer skills and needs assessment survey. J Med Internet Res. 2004;6(1):1-9.

35. Chemello C, Diniz RG, Nascimento MG. Patient safety best practices related to medication management in two public hospitals. Rev Bras Farmácia Hosp e Serviços Saúde. 2020;10(1):388. DOI:10.30968/rbfhss.2019.101.0388.

36. World Health Organization. Medication Without Harm; 2017. Available in: http://apps.who.int/iris/bitstream/10665/255263/1/WHO-HIS-SDS-2017.6-eng.pdf?ua=1&ua=1. Accessed on: May 20 2021.

37. Silva L, Afonso T, Sousa CV, *et al*. Vulnerabilidade e Riscos de Ruptura no Abastecimento de Materiais e Medicamentos na Cadeia de Suprimento em um Hospital Público. GEPROS. 2018;13(2):21. DOI:10.15675/gepros.v13i2.1832.

38. Nascimento A, Almeida RMVR, Castilho SR, *et al.* Análise de correspondência múltipla na avaliação de serviços de farmácia hospitalar no Brasil. Cad Saude Publica. 2013;29(6):1161-1172. DOI:10.1590/S0102-311X2013000600013.