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Evaluation of pharmaceutical services in risk management in the drug utilization in public hospitals of the Federal District, Brazil

Avaliação de serviços farmacêuticos na gestão de risco no uso de medicamentos em hospitais públicos do Distrito Federal, Brasil

Rodrigo Fonseca Lima[I,*]

Maria Inês Toledo[II]

Izabel Cristina Ferreira Schult Pereira[I]

Paulo Henrique Dourado Silva[III]

Janeth de Oliveira Silva Naves[IV]

[I] Departamento de Farmácia, Faculdade de Ciências da Saúde, Universidade de Brasília, Brasília, DF, Brasil

[II] Programa de Pós-Graduação em Medicina Tropical, Faculdade de Ciências da Saúde, Universidade de Brasília, Brasília, DF, Brasil

[III] Instituto de Matemática e Estatística, Universidade de São Paulo, *São Paulo*, SP, Brasil

[IV] Programa de Pós-Graduação em Ciências Farmacêuticas, Faculdade de Ciências da Saúde, Universidade de Brasília. Brasília, DF, Brasil

* **E-mail:** drigofl@gmail.com

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ABSTRACT

Introduction: The frequency of adverse events is high in hospitals and this context supported the elaboration of goals, whose execution involves the hospital pharmacy (HP). **Objective:** To evaluate HP's participation in risk management in medication use in 15 public hospitals in the Federal District (Brazil). **Method:** Cross-sectional study whose data collection was performed from May to November 2016 and involved hospital characterization and hierarchization, HP evaluation according to indicators related to risk management in the use of medicines and calculation of percentages of compliance with the activities provided for in the indicators (outcome variable) with subsequent correlation to variables that could influence their results through linear regression. **Results:** The average proportion of items presented in risk management indicators was 28.3%. Less than half of the active beds had an individualized dose as drug delivery system. There were 48 reports of pharmacovigilance in the period. The parameters that influenced the outcome variable were: staff training schedule, HP hours with pharmacist, active beds with individualized dose, and percentage of compliance with pharmaceutical services ($p < 0.05$). **Conclusions:** The results refer to the need for adequacy and monitoring of services aiming at rational interventions that seek to make the process of drug use safer, by implementing the management models related to HP.

KEYWORDS: Health Services Research; Patient Safety; Risk Management; Hospital Pharmacy Service; Pharmacovigilance

RESUMO

Introdução: A frequência de eventos adversos é alta em hospitais e esse contexto embasou a elaboração de metas, cujo cumprimento envolve a farmácia hospitalar (FH). **Objetivo:** Avaliar a participação da FH na gestão de risco no uso de medicamentos em 15 hospitais públicos do Distrito Federal (Brasil). **Método:** Estudo transversal cuja coleta de dados foi realizada de maio a novembro de 2016 e envolveu caracterização e hierarquização dos hospitais, avaliação das FH conforme indicadores relacionados à gestão de risco na utilização de medicamentos e cálculo dos percentuais de cumprimento das atividades previstas nos indicadores (variável desfecho) com posterior correlação a variáveis que poderiam influenciar seus resultados por meio de regressão linear. **Resultados:** A proporção média de apresentação dos itens previstos nos indicadores relacionados à gestão de risco foi de 28,3%. Menos da metade dos leitos ativos tinha dose individualizada como sistema de distribuição de medicamentos. Foram realizadas 48 notificações de farmacovigilância no período. Os parâmetros que influenciaram a variável desfecho foram: programação para capacitação de pessoal, horas de funcionamento da FH com farmacêutico, leitos ativos com dose individualizada e percentual de cumprimento dos serviços farmacêuticos ($p < 0,05$). **Conclusões:** Os resultados remetem à necessidade de adequação e monitoramento dos serviços visando intervenções racionais que busquem tornar o processo de utilização de medicamentos mais seguro, perpassando pela implantação de modelos de gestão relacionados à FH.

PALAVRAS-CHAVE: Avaliação de Serviços de Saúde; Segurança do Paciente; Gestão de Riscos; Serviço de Farmácia Hospitalar; Farmacovigilância

INTRODUCTION

In recent years, especially after the institutionalization of the Brazilian Unified Health System (SUS), assistance services focused on individuals or the community have become more decentralized and wide-ranging. These services are provided in different contexts through Healthcare Networks (RAS), in which hospitals are considered critical healthcare establishments (HCEs)[1,2].

Regardless of their classification, the quality of hospital care is the result of an interrelationship between administrative and care services, among which pharmaceutical services done in hospital environments by the hospital pharmacy (HP) stand out. Hospital pharmacies are the units responsible for several actions related to the availability and safe use of medicines. These units require that their employees perform clinical and managerial roles related to activities in the care, administrative and economic context[3].

Drug-related processes in a hospital are subject to failures that can cause direct harm and deprive users of therapeutic benefits[4]. In addition to legal aspects, there is a great concern over the culture of patient safety, an attribute that has been increasingly incorporated into the quality assessment of healthcare. Its implementation strategies aim to reduce the impact associated with the process mentioned above by improving aspects related to Donabedian's tripod of structure, process and results[5,6].

The unfavorable context for patient safety in hospital settings supported the creation of international goals related to the topic. This led to an increase in related scientific literature and encouraged the preparation of protocols, guidelines and institutional initiatives[7,8], with an emphasis on the safe use of medicines, whose compliance necessarily involves multiple hospital sectors, with highlights to the HP[4,9]. In hospital settings, the frequency of adverse drug events (AEs) is high, although many of these events are preventable[10,11].

Among the aspects that should be discussed in this context, safety in the identification of patients and in the care process related to the prescription and administration of drugs, the management of drugs with similar spellings and sounds and the so-called potentially hazardous drugs (PHDs) stand out, in addition to safety in correlated technical and managerial pharmaceutical processes, like acquisition, storage and distribution, to ensure quality services and products[12,13]. Thus, the risk management process in hospital contexts related to the use of medicines must involve an interdisciplinary team for the design and implementation of properly described, qualified, integrated and safe processes[4,6,14].

These procedures and activities must be continuously monitored through standardized indicators with a view to proposing interventions and formulating strategies to expand the management capacity of the public health sector, with a focus on care quality and safety, aiming at better performance despite limited resources[9,14,15,16]. The objective of this study was to assess the participation of HPs in activities with an impact on risk management in the use of medicines in 15 public hospitals managed by the Health Department of Brazil' Distrito Federal (SES-DF).

METHOD

The research corresponded to a cross-sectional study of an evaluative nature involving hospitals under the management of SES-DF. Data were collected from May to November 2016 through a questionnaire applied to those responsible for the HP after they read and signed the Free and Informed Consent Term (FICT), direct observation and document analysis. After data collection, the instruments were analyzed and double-checked for dubious or missing information.

The study involved three steps. In step 1, we did the general characterization of the hospitals and their subsequent hierarchy (stratification) according to their complexity. Hospitals were characterized according to type of care (general or specialized), size (small: up to 50 beds; medium: 51 to 150 beds; large: 151 to 500 beds; and extra: more than 500 beds)[17], active beds, hospital procedures (medium and high complexity) and hospital activities according to information from Brazilian health information systems[18] when data were collected.

After characterization, hospitals were classified into hierarchical strata (HS) of different complexities using the K-means non-hierarchical clustering method[19], which seeks to create data partitions so that the observations within the same cluster are similar to each other and different between clusters. Four strata were considered based on the reference of four scoring algorithms referring to the compliance of pharmaceutical services by hospital complexity proposed by Messeder, Osório-de-Castro and Camacho[20]. HS1 was the most complex stratum and HS4 was the least complex.

In step 2, HPs were evaluated according to validated indicators related to their support to risk management initiatives in the context of the hospitals where they were located. The indicators involved aspects related to the presence of a pharmacist during the opening hours of the pharmacy, the management of medicines, including PHDs and medicines with similar spellings and sounds, and technical and managerial activities related to the distribution of medicines[21]. Moreover, the amount of pharmacovigilance reports (referring to the data collection period) was also considered (in absolute terms and in proportional terms compared to other types of reports).

Finally, in step 3, the percentage of presentation of the items from step 2 was calculated in comparison to the said ideal level (presentation of all items). This enabled us to rate the HPs as to their support to risk management activities as regular, average and good compliance (0.0%–33.3%, 33.4%–66.5% and 66.6%–100% of the ideal, respectively; outcome variable)[20].

The aforementioned percentages of compliance by HPs were considered as an outcome variable and were analyzed for normality by the Shapiro-Wilk test, compared by HS by Analysis of Variance (ANOVA) and correlated to potentially influencing variables through linear regression analysis (with subsequent estimate of the parameters analyzed on the outcome variable). The variables analyzed in this context were related to managerial aspects, such as workload and presence of a pharmacist at the HP's opening hours, and to the compliance of pharmaceutical services that could be directly or indirectly associated with the outcome variable.

Said pharmaceutical services correspond to those provided for in the logical model proposed by the Hospital Pharmacy Diagnostic Project in Brazil, which considered ten macro-components related to hospital pharmaceutical services – programming logistics, acquisition and storage, distribution, management, selection, information, pharmacotechnics, pharmacotherapeutic monitoring (PM) and education & research (E&R) – evaluated according to validated indicators[20,22]. The results of this normative assessment were expressed as a percentage of approximation to the ideal levels of service compliance calculated for each hospital (overall percentage of approximation)[22], according to the methodology defined and published previously, without, however, referring to aspects related to risk management in the use of medicines in the hospitals where the HPs performed their activities[23].

After verification, all data were compiled in an Excel® spreadsheet. The description of categorical variables was achieved by calculating absolute and relative frequencies. Continuous variables were reported by the mean. Statistical analysis was performed in the R program at a 5% significance level.

This research corresponds to an excerpt from a project called "Evaluation of pharmaceutical services in hospital pharmacies managed by the Health Department of the Distrito Federal", approved by the Research Ethics Committee of the School of Health Sciences of the University of Brasília (opinion number 1.511.600) and by the Health Sciences Teaching and Research Foundation of SES-DF, as a co-participant institution (opinion number 1.559.785).

RESULTS

The complexity stratification method resulted in the classification of one (6.7%) hospital as HS1, six (40.0%) hospitals as HS2, five (33.3%) as HS3 and three (20.0%) as the stratum of smaller complexity (HS4) (Table 1). The average number of active beds in the hospitals was 264, ranging from 53 (HP9 – HS4) to 600 beds (HP6 – HS1) and the average number of hospitalizations in the research period was 9,113, ranging from 600 (HP5 – HS4) to 19,147 (HP6 – HS1) (Table 1).

Although only one of the pharmacies (6.7%) had a head pharmacist registered as such in the Regional Pharmacy Council, all had a person responsible for the sector. In 14 HPs, the person in charge was a pharmacist (in one HP, the person in charge was an administrative technician).

All HPs had pharmacists and carried out technical-managerial and technical-assistance services. The average of pharmacists and their associated workloads were higher in more complex HS, especially in HS1, as can be seen in Table 1. The average number of pharmacists per HP was eight (ranging from three to 26; total of 118) and the ratio of pharmacists per bed was one to 34. The average workload of pharmacists per bed was 1 h (minimum = 0.5 h and maximum = 3.4 h) (Table 1).

The opening hours of the HPs varied according to the days of the week and only one HP (6.7%) had a pharmacist present during all opening hours (Table 1).

All hospitals had computer systems to enable the prescription of medications. The most common distribution system for these medications was mixed: 11 out of 15 HPs (73.3%). Only one hospital had an individualized distribution system for all active beds (HP5) and the proportion of beds with individualized doses in hospitals with a mixed distribution system varied between the HS (Table 1). Of the 3,958 active beds, considering all HPs with individualized or mixed distribution system, 1,759 (40.7%) were served by an individualized distribution system (that is, distribution of drugs per patient, according to the medical prescription, generally for a 24-hour treatment period). The other beds were served by the collective medication distribution system, that is, drugs distributed by inpatient unit or service, as requested for all patients in the care unit (Table 1). The overall average percentage of approximation of the pharmaceutical services, considering the 15 HPs, was 60.7 (Table 1).

In all hospitals there was a formally established Patient Safety Center (PSC), and in one of the centers there was no participation of pharmacists. Three (20.0%) respondents reported that the pharmacy service had not supported nor was aware of any initiative conducted by their hospitals' PSC. The results of the indicators related to the support of HPs in risk management in the context of the hospitals where they were located (step 2) are shown in Table 2.

Although only one respondent reported that the HP performed formal pharmacovigilance activities, related practices were supported by the pharmacy service in 11 of the 15 hospitals (73.3%). A total of 313 reports were made to the National Health Surveillance Agency (Anvisa) through the PSCs, 48 (15.3%) of which regarding pharmacovigilance, 129 (41.2%) technovigilance and 136 (43.5%) hemovigilance. The total number of reports regarding pharmacovigilance by HS was one for HS1 (1.3% of the total of 77 reports), 39 for HS2 (19.6% of the total of 199 reports), eight for HS3 (10.7 % of 75 reports) and zero for HS4, which had only one report (regarding hemovigilance). The distribution of reports by type, HP and HS is shown in Figure 1.

The average proportion of presentation of the items provided for in the indicators related to risk management considering

Table 1. General characterization of hospitals and HPs from the sample. Brazil's Distrito Federal, 2016.

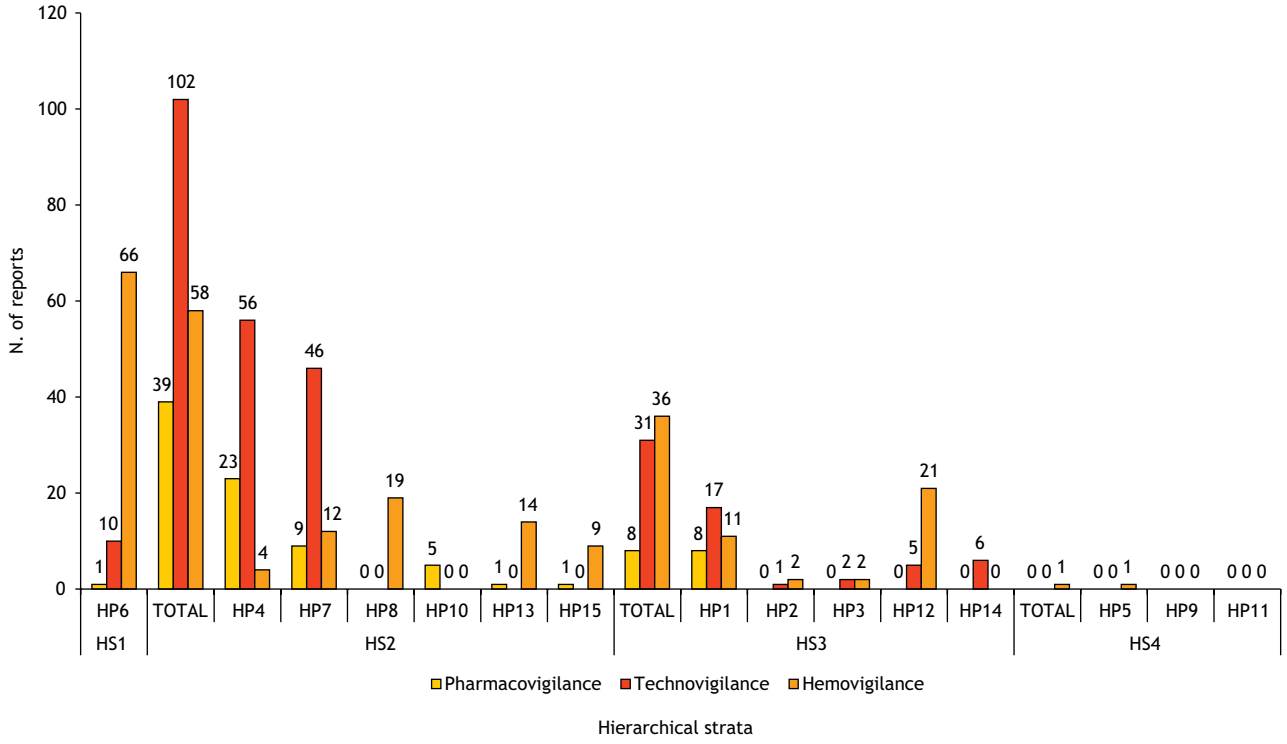
HS	PH	Size	Active beds	Hospitalizations	Pharmacists				Opening hours with pharmacist		Medication distribution system	% of active beds with individualized dose	% approximation of compliance with pharmaceutical services
					N.	WL (h)	Proportion per active bed	Proportion WL per active bed	Mon-Fri	Wkd-Hol			
1	6	Extra	600	19,147	26	840	1:23	1.4 h/bed	12.0	12.0	Mixed	90.0	43.9
2	4	Large	420	12,688	13	440	1:32	1.0 h/bed	24.0	24.0	Mixed	92.1	67.0
	7	Large	266	12,262	6	180	1:44	0.7 h/bed	12.0	6.0	Mixed	28.2	52.9
	8	Extra	484	15,443	10	360	1:48	0.7 h/bed	12.0	12.0	Mixed	1.7	46.5
	10	Large	322	7,576	8	260	1:40	0.8 h/bed	12.0	12.0	Mixed	74.5	65.5
	13	Large	300	15,084	11	340	1:27	1.1 h/bed	12.0	12.0	Mixed	3.3	57.6
	15	Large	450	15.624	8	240	1:56	0.5 h/bed	12.0	12.0	Mixed	22.2	55.4
3	1	Large	171	7,242	6	160	1:29	0.9 h/bed	12,0	120,	Mixed	34.5	49.4
	2	Large	216	7,082	7	220	1:31	1.0 h/bed	12.0	12.0	Mixed	54.6	58.2
	3	Large	168	7,155	4	120	1:42	0.7 h/bed	10.0	0.0	Collective	0.0	53.4
	12	Medium	130	8,187	4	160	1:33	1.2 h/bed	12.0	12.0	Mixed	71.5	53.5
	14	Large	169	5,113	3	120	1:56	0.7 h/bed	12.0	0.0	Mixed	37.9	51.9
4	5*	Medium	65	600	6	220	1:11	3.4 h/bed	12.0**	0.0	Individualized	100.0	97.7
	9	Medium	53	1,590	3	120	1:18	2.3 h/bed	10.0	0.0	Collective	0.0	72.5
	11*	Medium	144	1,905	3	120	1:48	0.8 h/bed	12.0	0.0	Collective	0.0	85.2
AVERAGE			**264**	**9,113**	**8**	**260**	**1:34**	**1.0 h/bed**	**12.5**	**8.4**	-	**40.7**	**60.7**

Source: Prepared by the authors, 2019.
HPs: hospital pharmacies; WL: Workload; HS: hierarchical stratum; Wkd: weekend; Hol: holiday; h: hour; Mon: Monday; Fri: Friday
* Specialized hospitals.
** The hospital pharmacy at hospital 5 only operated from Monday to Friday from 7 am to 7 pm.

Table 2. Results of the indicators related to the support of the 15 HPs to risk management in the context of the hospitals where they were located. Brazil's Distrito Federal, 2016.

	Name of the indicator	Results	
		N	%
1	Availability of a pharmacist during the opening hours of the pharmacy	2	13.3
2	Existence of a protocol for detecting, recording and communicating medication errors in which the Pharmacy Service participates	1	6.7
3	Existence of a list of abbreviations, symbols and expression of doses associated with medication errors	2	13.3
4	Existence in the hospital of standards or protocols on the correct storage, conservation and replacement of medicines in the wards/clinics	1	6.7
5	Existence in the hospital of standards or protocols on the correct storage, conservation and replacement of medicines in the Pharmacy Service	11	73.3
6	Existence in the pharmacy service of standards or protocols on labeling and repackaging of medicines in unit/individualized dose*	7	58.3
7	Existence of procedures for the maintenance of emergency trolleys	8	53.3
8	Existence of a list of PHDs in the hospital	12	80,0
9	Existence of rules on PHD administration (maximum doses, duration, route of administration, dose calculation double check)	1	6.7
10	Percentage of beds with unit dose distribution (Monday to Friday/weekends and holidays)	0	0.0
11	Percentage of beds with individualized dose distribution (Monday to Friday/weekends and holidays)**	1,759	40.7

Source: Prepared by the authors, 2019.
PHD: Potentially Hazardous Drug; N: quantity
* In 3 hospital pharmacies the distribution system was collective.
** Considering all beds, including those with individualized doses in hospitals with a mixed distribution system.

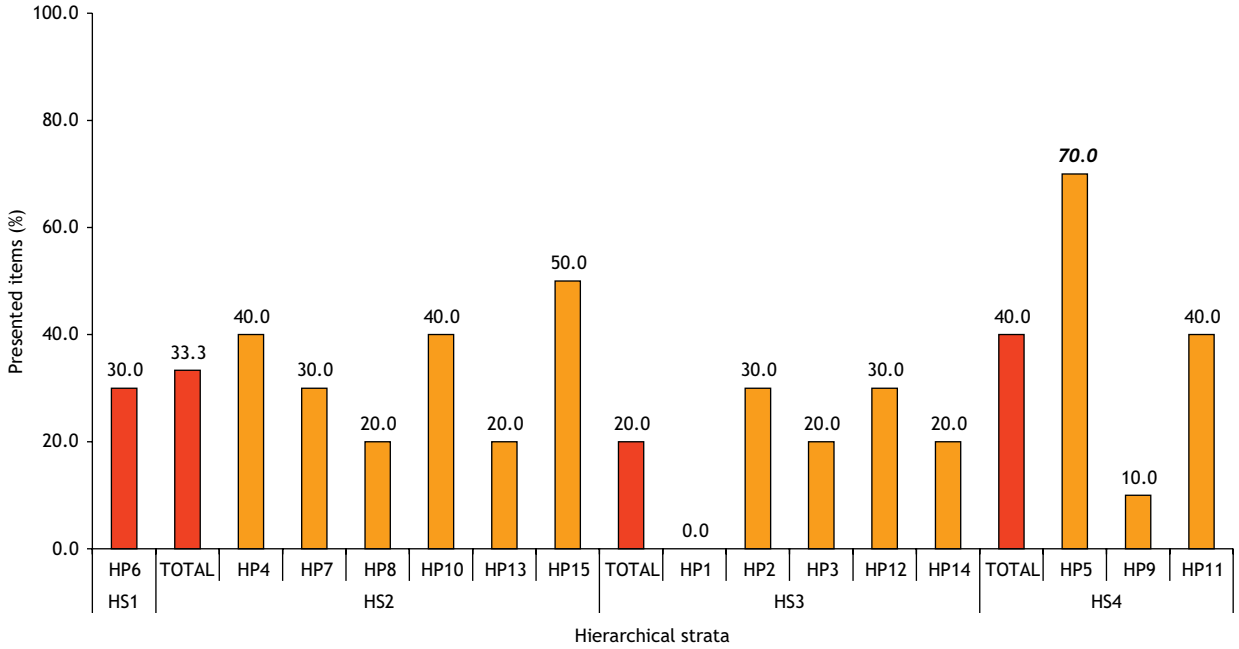


Source: Prepared by the authors, 2019.
HP: Hospital Pharmacy

Figure 1. Distribution of reports by type, Hospital Pharmacy and hierarchical stratum. Brazil's Federal District, 2016.

all HPs was 28.3% (classified, therefore, as regular compliance) and only one HP, belonging to the less complex HS, had its compliance rated as good in relation to the expected items. In order to achieve this result, the context of the SES-DF was considered regarding distribution systems, so that the existence of the individualized distribution system in all beds was considered as an item to be presented by the HP.

The overall percentages of approximation have shown normal distribution and the averages for HS were 30.0%, 33.3%, 20.0%



Source: Prepared by the authors, 2019.
HP: Hospital Pharmacy
Bold/italic: HP whose proportion of presentation of the items was high, suggesting good compliance with the activities.

Figure 2. Proportion of presentation of the items foreseen in the indicators related to risk management. Brazil's Federal District, 2016.

Table 3. Linear regression analysis with reference to the estimated parameters analyzed on the outcome variable and associated statistical significance. Brazil's Federal District, 2016.

Variable (parameter)	Estimate of the parameter (beta)	CI95	p
Proportion of active beds with individualized dose	0.24	0.01-0.47	**0.0427**
Pharmacist workload per bed	8.33	-4.06-20.73	0.1701
Opening hours with pharmacist	0.50	0.12-0.87	**0.0131**
Human resources training program	28.85	5.83-51.86	**0.0179**
Percentage of approximation of compliance with pharmaceutical services	0.70	0.17-1.24	**0.0141**

Source: Prepared by the authors, 2019.
CI95: 95% confidence interval.

and 40.0% for HS1, 2, 3 and 4, respectively (Figure 2). The percentage of approximation has shown no statistically significant differences between the strata (p = 0.4230).

Table 3 presents the influences on the percentage of approximation of compliance of services and associated statistical significance resulting from the linear regression analysis. The variables related to the training program for human resources and the pharmaceutical workload per bed were those that most influenced the outcome variable: the proportional increase of 1% in relation to these variables led to an increase of 28.85% and 8.33% in the percentage of approximation of compliance with services related to the support of risk management activities regarding the use of medicines, respectively. Of these, however, only the first had some associated statistical significance (p = 0.0179) (Table 3).

The other variables that could potentially explain the outcome variable with statistical significance were the proportion of opening hours of the HP with a pharmacist, the proportion of active beds with individualized dose and the overall percentage of approximation of compliance with pharmaceutical services (p = 0.0131, p = 0.0427 and p = 0.0141, respectively). However, the influence of these variables was small: the proportional increase of 1% in relation to these variables referred to the increase of 0.50%, 0.24% and 0.70% of the percentage of approximation of compliance of services related to outcome variable (Table 3).

DISCUSSION

The results we found suggest substantial problems in risk management activities concerning the use of medicines in hospitals under the management of SES-DF at the time of data collection, with a subsequent likelihood to affect the quality of care provided there.

When analyzed together with human resources data and those related to pharmaceutical services in a specific way, these results reflect the need to adapt practices and constantly monitor related actions, especially considering the clinical and financial impact associated with potential AEs resulting from the failure to perform essential activities with regard to risk management in the use of medicines.

In this sense, it is essential that risk management activities involve pharmaceutical services, which, just like other players in the hospital context, need to be extended considering the efficiency of the initiatives and the safety of patients[3,5,24,25]. The statistically significant positive influence of the overall percentage of compliance with pharmaceutical services on the outcome variable, related to support for risk management activities, reflects the need for this discussion.

We found a smaller number of beds per pharmacist than what was found by the Hospital Pharmacy Diagnostic Project in Brazil, carried out in the early 2000s and involving a sample of 250 Brazilian hospitals[21]. However, the number we found was higher than that recommended by the Brazilian Society of Hospital Pharmacies[3] and higher than that found by Silva et al.[26] in an evaluation study conducted in an HP in Rio de Janeiro.

These results show the need for HPs to have enough professionals to do their job without overwork, in order to optimize resources and increase safety in the activities they perform[27,28]. Furthermore, it is important to mention that, by means of the regression analysis, although there is no statistical significance associated with it, the parameter of pharmaceutical workload per bed had one of the highest estimates regarding the influence on the variable related to the support to risk management activities.

The specific indicators on the support of HPs to risk management within the hospitals where they were located revealed important problems from the point of view of patient safety, especially if we consider data on the availability of a pharmacist during all hours of the HP's operation and data on the distribution of medicines[4,29].

Only one HP had a pharmacist during all its opening hours, one HP did not have a professional pharmacist as the responsible person and only one HP had a head pharmacist registered in the Regional Pharmacy Council. These data suggest managerial inadequacies and point out aspects that are not in compliance with what is legally established in Brazil[3,30,31].

These inadequacies can impact the quality of the services extended by HPs, especially when analyzed together with the results directly related to the support of HPs to risk management in the use of medicines within the hospitals where they are located. The influence of the variable associated with the opening hours of the HP with a pharmacist, with statistical significance over these risk management activities, translated as the "outcome" variable, corroborates this discussion.

Furthermore, according to Law n. 13.021, of August 8, 2014, which provides for the exercise and inspection of pharmaceutical activities, it is the responsibility of the pharmacist to carry out pharmacotherapeutic follow-up of patients, regardless of the scope, in order to avoid possible AEs. Moreover, it is the responsibility of the government to ensure pharmaceutical assistance, according to the SUS principles and guidelines of universality, equity and integrality[30].

Any inventory management policy in hospital settings must consider the need to adequately meet the demands for the distribution of medicines to care units. This requires modernization of technical resources, adequate infrastructure and human resources qualification aiming at improved service efficiency and patient safety and increased ability to intervene on risks and promote changes in work processes[6,32,33,34]. It should be noted that, in this context, computerization favors the implementation of a more decentralized distribution system (that is, the HP has more than one unit to meet the demands of clinical units) and less propensity for errors related to the use of medicines in the hospital environment[35].

However, although the sample hospitals had computer systems that enabled the recording of their activities, some important aspects stood out, like the fact that there was still an HP with a collective medication distribution system and that less than half of the active beds, considering all hospitals in the sample, had an individualized system as their distribution system at the time of data collection.

These results may have a negative impact on access to medication and availability of HR for the provision of care. It is also of the utmost importance to mention that the collective distribution system can lead to problems in terms of safety in the use of medications and the creation of substocks[32,35,36]. It is worth mentioning that the positive and statistically significant influence of the specific parameter of the proportion of active beds with individualized doses on the variable of support to risk management activities strengthens this discussion.

In addition, the limited availability of a PHD list with related clinical information and abbreviations, symbols and expressions associated with medication errors also attracts attention. In hospital settings, it is essential that strategies for identifying, evaluating and adjusting problems in the use of health technologies be adopted. This involves proposing protocols based on scientific evidence where aspects of each process related to patient safety are defined, including specific procedures, workflows and lists, for example[8,14,37,38].

In order to meet managerial and care demands related to risk management in the use of medications in hospitals, there are increasing demands for further professional training, in addition to more human resources available[3,6]. Therefore, professional training is essential and has important potential impacts in terms of safety. The result of the influence of the human resources training variable on the outcome variable corroborates these aspects. Additionally, it should be noted that it is essential that surveillance and monitoring practices on the use of medicines be adopted, as provided for in Law n. 13.021/2014[30], with a view to

controlling AEs and providing quality care, including the activities performed by HPs[4,37].

The adverse event reporting rate was low when we consider the proportion of services performed in the context of the SES-DF hospital network, especially when it comes to pharmacovigilance reports. This, however, does not necessarily reflect the adequacy of services in terms of safety, but rather some underreporting, especially when we consider the other results found in this research, something that has also been shown in other studies[39,40]. In addition, these HCEs are some of the most susceptible places, given the amount and complexity of the procedures and technologies involved[5,10,41,42].

Some important limitations related to the type of study and the methodology must be considered, in addition to the specificity regarding the sample of hospitals used in this research. These conditions hinder extrapolations regarding the results. Furthermore, it is important to note that, in some cases, there may be factors that are not subject to local adjustments and justifiable reasons for the low proportion of compliance with activities that should be considered for intervention to improve the effectiveness and efficiency of services based on a management model suited to the processes involved in the value chain in all its dimensions, according to each hospital context[25,43,44].

CONCLUSIONS

The results have shown the need for adaptation of practices and constant monitoring of the related services. It is worth mentioning that rational interventions are needed to expand the proportion of assistance activities and the ability of local management to make them more effective, efficient, qualified and safe from the point of view of the use of medicines in the hospital. This must include the implementation of management models for the HPs.

These management models should be discussed from the perspective of the importance of managerial changes, such as those related to the availability of a professional pharmacist during all the opening hours of the HP and to the medication distribution system. These factors have an important impact on healthcare services in terms of risk management in the use of medications in hospital settings. All of these aspects must involve professional training and structural adequacy considering the particularities of each region where the hospitals are located, so as to improve and/or reorient the relevant activities.

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Authors' Contribution

Lima RF - Conception, planning (study design), data acquisition, analysis and interpretation and writing of the paper. Toledo MI - Writing and reviewing the paper. Pereira ICFS, Silva PHD - Data acquisition, analysis, and interpretation. Naves JOS - Conception, planning (study design) and writing of the paper. All authors approved the final draft of the paper.

Conflict of interest

The authors report that there is no potential conflict of interest with peers and institutions, nor political or financial conflicts in this study.