



The Process of Drug Dispensing and Distribution at Four Brazilian Hospitals: a Multicenter Descriptive Study

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SUMMARY. A multicenter descriptive study was carried out in two steps: an interview with providers involved in the medication processes, and then non-participating observation of their environment and practices. Only one hospital was found to have a bar-coding, dispensing system connected to a computerized prescription system. In all participating hospitals at least 90% of the drugs were dispensed and distributed as unit doses, but in none of them did pharmacists assess prescriptions. The study findings showed that the processes of drug dispensing and distribution in Brazilian hospitals encounter several problems, mostly associated to work environment conditions and inadequacy in drug ordering and requests.

RESUMEN. Fue realizado un estudio descriptivo multicéntrico en dos etapas: entrevista a los profesionales responsables de los sistemas de medicación y observación no participante del ambiente y de las actividades de dichos profesionales. Los resultados mostraron que solamente el hospital A tenía sistema de código de barras para la autorización y la prescripción por sistema computarizado. En todos los hospitales la autorización y distribución de por lo menos el 90% de los medicamentos era hecha en dosis individualizadas, pero en ninguno de los hospitales hubo evaluación de las prescripciones por los farmacéuticos. Los procesos de dispensación y distribución de los medicamentos en hospitales brasileños registran varios problemas, asociados principalmente a las condiciones del ambiente y a las inadecuaciones de las recetas.

INTRODUCTION

In the last few years many experts and investigators have been concerned with the issue of medication errors. The literature shows these errors have caused about 7,000 deaths in American hospitals and accounted for around 30% of the injuries inflicted on patients while they were hospitalized^{1,2}. Poor planning of medication systems have been seen as the leading cause of errors, contrasted to approaches focusing just on mistakes providers made while providing drug therapy³.

It is thus crucial for health care providers involved with medication (physicians, pharmacists, and nursing staff) to be familiar with its system and different processes (drug prescription, dispensing, and administration). This is pri-

marily a multidisciplinary system where actions of the involved participants are directly linked and mutually dependent and therefore any flaws in one of the processes will affect the other providers' actions and patient care. If the team knows the system, providers are able to work together and can identify weaknesses in each process, suggest error prevention strategies and reduce errors, helping to improve care provided to the patients.

The pharmacy interconnects many procedures of different areas of the medication process in a hospital. For that reason, physical structure, human and technological resources, and work organization according to state-of-the-art standards for patients' safety are essential for preventing and reducing medication errors³.

KEY WORDS: Dispensing, Medication errors, Medication systems.

PALABRAS CLAVE: Dispensación, Errores de medicación, Sistemas de medicación.

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There has been an exponential growth in research published about medication errors in the last few years; however, most studies have focused on prescribing and administration processes^{4,5}. While dispensing errors can also result in significant harm to the patient, there has been relatively little research on the subject. For example, in 1999, 2.4 million prescriptions were inappropriately dispensed in hospitals². Though this has been investigated in Brazil since the 1990s, the amount of research is still not significant³ and most studies have been more concerned with medication administration and prescription errors.

The present article is part of a large study that found errors at many stages of the medication system at four Brazilian hospitals, mostly related to drug prescription and administration⁵⁻⁷. Given that, we believe it is imperative to deal with this problem, focusing now on dispensing and distribution processes in order to make recommendations for preventing errors seen in Brazilian hospital settings.

The present study aimed at identifying weaknesses and problems in the process of drug dispensing and distributing that could lead to medication errors at four Brazilian hospitals, and intended to propose strategies for improving these processes in these settings.

MATERIAL AND METHODS

A multicenter descriptive study was carried out at four Brazilian hospitals in the cities of Recife, Ribeirão Preto, Goiânia, and São Paulo. The studied hospitals were described as Hospital A (604 beds), B (740 beds), C (315 beds), and D (535 beds), not respectively. The present study especially focused on the stages of drug dispensing at the hospitals' pharmacies. These hospitals were chosen due to the fact they are affiliated to state and federal, public universities and integrate the Sentinel Hospital Network of the Brazilian National Health Surveillance Agency (Anvisa).

The sample comprised medication systems' administrators and all pharmacists, pharmacist residents, and pharmacy technicians and assistants involved in dispensing and distribution processes, as well as pharmacy managers who agreed to participate.

The study was conducted in two steps. First, providers involved with the medication system at each of the studied hospitals were interviewed using a structured questionnaire developed by the group of researchers to gain

knowledge of drug dispensing and distribution in these settings. A guide, adapted from Hatfield's study⁸, was used to identify strategic aspects for assuring the safety of drug therapy, such as: is the pharmacy opened 24 h/day?; how are the doses distributed to the wards?; do the pharmacists provide medication information to the health care professional when needed?; do the pharmacists review the medication order for the proper therapeutic indication, proper dose, and allergy related to the medication prescribed?; is there double checking before a medicine is dispensed to the wards?. Second, a direct non-participant observation was conducted through a semi-structured instrument, also developed by the group of researchers. An orientation for the providers involved with dispensing and distribution processes was provided by the research team before observations started. They were put to equal about the investigation before it takes place and they were asked to give informed consent.

The work environment was observed for seven days (including weekends) on three different work shifts, and the work process was followed from the time a drug prescription was provided to the pharmacy up to when the ordered medications were distributed to the wards. The intention was to identify weaknesses and problems in the processes that could lead to medication errors. The observers wrote down exactly what the subject did, including details related to poor illumination, inadequate furniture, noises, and task interruptions.

Twelve research assistants were hired and trained. They underwent 20-hour of observation training sessions which included classroom lectures and practical observations. The team of observers at each hospital consisted of a researcher and three research assistants, most of them registered nurses. All study-related activities were carried out simultaneously at the four participating hospitals. The study was approved by the Research Ethics Committees from the four hospitals.

RESULTS AND DISCUSSION

Description of the process of drug dispensing and distribution

Of the four studied hospitals, only Hospital A had implemented a computerized physician order entry system, as well as medication prescription by generic name only. The other three hospitals relied on handwritten orders and prescribers ordered drugs by both their generic and

brand names. The literature reports that prescribing orders electronically reduces the need for handwriting them, which can often lead to misinterpretation and administration of the wrong medication. Illegibility can be aggravated by look-alike and sound-alike names⁹. It is well known that handwritten orders can make it difficult to discriminate between two similar drug names. Many drugs have similar names and drug names may sound similar, leading to confusion particularly when they are administered through the same route or at similar dosages³.

Also, all four hospitals allowed doctors to use abbreviations while prescribing, as abbreviations were allowed in their institutions. In Hospital A, abbreviations could be filled in the blank space provided for doctors and administrative officers' use. In Hospital B, abbreviations were used even for drug names (e.g., HCTZ standing for hydrochlorothiazide) and their pharmaceutical forms. The use of abbreviations by health care providers in the dispensing process can result in errors with the replacement of dosage forms, changing their pharmacokinetic properties, such as drug solubility, which is especially important for drug absorption¹). Prescribers should avoid using abbreviations or make use of the ones standardized by the institution.

In all hospitals studied, the distribution of at least 90% of the drugs was as individualized doses, an improvement when compared to the collective system where each hospital unit has its own drug supplies at nursing stations. Individualized dose, drug distribution reduces economic losses from expired drugs, inadequate packaging, time lag between purchase and repayment after drug use, and, above all, reduces the likelihood of administration errors due to the great availability and variety of drugs¹¹. In Brazil, 34.8% of hospitals use this drug dispensing system for inpatients¹². However, none of the hospitals studied had a unit drug distribution system in place. The literature shows that a unit dose system has several advantages concerning the patient's safety. This new system allows nursing staff to spend less time preparing medicines and increase time spent caring for the patient¹).

In regard to pharmacy operation time, only Hospital D did not have a 24-hour schedule to answer questions on medication use and their distribution process. There, the central pharmacy was open 12 h a day and distributed drugs to intensive care units, and only the emergency

unit's satellite pharmacy remained opened 24 h a day. The remaining pharmacies had mini-supplies at both critical areas and wards. Having a hospital pharmacy open 24 h a day is vital for the medication system and is highly recommended, as it avoids drug storage in hospital units. Pharmacies play a relevant role in the medication system and should be open 24 h a day, as they are involved in drug selection, standardization, storing, packaging, distributing, and dispensing. It is thus important to have qualified pharmacy providers to perform and supervise those activities for assuring the efficiency and safety of the therapeutic arsenal used¹⁰.

In all hospitals studied, it was noticed that pharmacists did not clinically review prescriptions (concerning allergic reactions, drug interactions, and overdoses). Hospital B has recently started pharmacy training to capacitate its providers for this task and will be able to provide relevant information to other health care providers about new medications and the ones not yet standardized^{10,14}. As many hospital pharmacies in Brazil generally have only one pharmacist on their staff, pharmacy assistants' work goes mostly unsupervised and unchecked. Also, pharmacy assistants are usually trained in-service³.

Hospitals A, B, and C did not carry out any double-check before dispensing medications and Hospital D did not have a prescription check system. To ensure an accurate dispensing process before medicating the patient, if feasible, a second provider should carry out an independent check, checking if the dispensed drug matches the prescribed one and the bar coding, as well^{15,16}.

Concerning bar coding, only Hospital A had adopted this technology. Hospital B was intending to implement it and had pre-tested this system. The literature demonstrates that bar coding technology helps to reduce human error⁹, reducing the proportion of wrong medication dispensed by 75%, wrong patient administration by 93%, wrong administration timing by 87%, missed doses by 70%, and dose errors by 62%¹⁷. The process of drug dispensing and distribution with problems can lead to the occurrence of medication errors, making it necessary to redesign the process in order to increase safety and reliability¹⁸.

Weaknesses and problems in the process of drug dispensing and distribution

A total of 30 pharmacy providers from the

following categories were observed: pharmacist, pharmacist resident, pharmacy technician, pharmacy assistant, and pharmacy clerk. All of them are part of the Brazilian pharmacy system. Data obtained during the observations are presented according to the following categories: 1) *Environmental conditions*: environment-related problems such as noise, lack of organization, inappropriate conditions (poor lighting and ventilation, and intense flow of people), interruptions; 2) *Drug ordering*: problems associated with drug orders and requests to the pharmacy due to a lack of proper forms and incomplete order forms; 3) *Drug dispensing, distribution, and supply*: problems related to drug distribution, such as inappropriate drug division and packaging, non-dispensed drugs, inadequate distribution control, and staff and drug shortages, 4) *Non-compliance with rules*: non-compliance with the hospital's established procedures;

5) *Staff problems*: mismanagement while performing one's tasks; 6) *Drug checking and recording*: inadequate checking, recording, or writing down of the drug distributed; 7) *Drug prescription*: poorly written or incomplete prescriptions that are likely to affect pharmacy staff work; 8) *Drug knowledge*: Hospital unit and pharmacy providers' questions on drug use, dose, preparation, and administration; 9) *Interaction with other services*: Inadequate interaction with other services and providers; 10) *Computerized system*: problems with electronic equipment (optical bar code reading, computers); 11) *Others*: equipment-related and internal communication problems.

The study results show that problems related to the pharmacy's work environment conditions were most frequently reported by the observers on account of inadequate furniture, constant noises, task interruptions, and concomitant per-

Category	Problem description	Frequency	
		N	%
Environment conditions	1-Lighting problems	17	25.7
	2-Furniture-related problems		
	3-Noise-related problems		
	4-Task interruptions		
Drug ordering	1-Lack of proper prescription forms for regulated drugs	15	22.7
	2-Incomplete prescription forms for regulated drugs		
	3-Incomplete forms and orders		
Drug dispensing, distribution, and stocking	1-Drug was not dispensed	7	10.6
	2-Duplication of drug division of a same unit by two different people at the same time		
	3-Inadequate distribution control		
	4-Drug shortages		
	5-Staff shortages		
Non-compliance with the rules	1-No drug bar coding	6	9.1
	2-Lack of safe packaging of psychotropic drugs		
	3-Inadequate return of unused drugs by the unit		
Staff	1-Provider's mismanagement or inappropriate attitude while performing one's tasks	5	7.6
Drug checking and recording	1-No checking or inadequate checking of the drug dispensed	5	7.6
	Other	1-Problems related to the drug cart design and packaging of drugs to be delivered to the units	4
Drug knowledge	1-Information on drugs were not provided to unit providers	3	4.5
Computerized system	1-Problems related to the optical bar code reading system	3	4.5
Drug prescription	1-Prescription problems: incomplete information, prescription error	1	1.5
Total		66	100

Table 1. Problems in the process of drug dispensing and distribution found at Hospital A, by category, problem description, and frequency, 2002.

Category	Problem description	Frequency	
		N	%
Environment conditions	1-Lighting problems	59	53.6
	2-Ventilation problems		
	3-Noise-related problems		
	4-Cleaning-related problems		
	5-Task interruptions (phone, other requests)		
	6-Problems related to the flow of people in the premises		
	7-Furniture-related problems		
Drug dispensing, distribution, and stocking	1-Inadequate organization (storage, distribution, and flow)	31	28.2
	2-Chatting while performing tasks		
	3-Drug misidentification		
	4-Concomitant performance of multiple tasks		
	5-Deficient task assignment		
	6-Delay in task performance		
Drug checking and recording	1-No checking or incomplete checking of task performed	11	10
Interaction with other services	1-Problem miscommunication to affected services	4	3.6
Drug ordering	1-Incomplete or incorrect forms	3	2.7
Non-compliance with the rules	1-Non-compliance with the recommended procedure: piling up of orders	1	0.9
Computerized system	1-Problems related to access to or use of computerized system: system shut down	1	0.9
Total		110	100

Table 2. Problems in the process of drug dispensing and distribution found at Hospital, by category, problem description, and frequency, 2002.

formance of multiple tasks (Table 1). The U.S. National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) makes recommendations on the planning of the drug dispensing area for preventing errors. The area plan should focus on environmental conditions to reduce fatigue (lighting, air conditioning, level of noise, ergonomic settings); minimize disturbances (phone and task interruptions, lack of orderliness, unrelated tasks); and provide adequate staffing and other resources consistent with the workload ¹⁵.

Table 1 also illustrates problems related to drug orders, including lack of proper forms and incomplete order forms and prescriptions, which can also lead to medication errors and delay in the distribution process.

Besides the aforementioned environment-related problems, Table 2 shows other dispensing problems reported due to difficult access to some drugs, drugs with no expiration date, and drug division by staff while answering the phone.

Table 3 shows that Hospital C also had problems related to drug checking (11; 30.6%); while dispensing drugs, pharmacy technicians did not

check drug labels and verified only the drug identification on the pigeonhole. In addition, pharmacy technicians and assistants did not double-check the drug dispensed, which could lead to drug dispensing error. These findings underscore the need for either automated checking or a pharmacist's checking before sending out the ordered drugs to the units (Table 3). A double-check serves as a safe net for preventing medication errors identified in the dispensing process. The final dispensing check is clearly important in preventing medication errors to the patients, and the staff involved with dispensing and labeling should bear in mind they are not infallible ⁴.

There were 6 (16.7%) observation reports of non-compliance with the rules when staff performed tasks that were not part of their jobs. For instance, messenger boys dispensed drugs and provided information on drugs when either pharmacy technicians or pharmacists were not available. Unfortunately, improved methods for encouraging staff to take responsibility for labeling and dispensing still need to be explored ⁴.

Table 3 also shows that 6 (16.7%) problems concerning drug dispensing and stocking were

Category	Problem description	Frequency	
		N	%
Environment conditions	1-Task interruptions: phone, chatting. 2-Noise-related problems: TV, constant phone ringing. 3-Problems related to environment temperature. 4-Furniture-related problems: not enough pigeonholes for all drugs. 5-Other environment conditions (disorderly).	11	30.6
Drug checking and recording	1-Technical flaws while checking drugs: no checking of drug names after picking them out from their respective pigeonholes following the prescription. 2-No drug double-checking.	7	19.4
Non-compliance with the rules	1-Tasks performed by non-qualified staff: a female clerk was the head of the pharmacy shift and drug division. A messenger boy divided the drugs to be sent out to the units.	6	16.7
Drug dispensing, distribution, and stocking	1-Drug shortages: 45 empty drug pigeonholes, among them, propranolol, enalapril, nystatin suspension, sabutamol, boric water etc. 2-Staff shortages: messenger boys and clerks helping out with drug division and dispensing. 3-Drug dispensing problems: wrong procedure.	6	16.7
Staff	1-Staff mismanagement: task interruption to watch TV	3	8.3
Drug knowledge	1-Information on drugs was not provided to the units	2	5.6
Drug ordering	1-Inadequate forms for antibiotic control	1	2.8
Total		36	100

Table 3. Problems in the process of drug dispensing and distribution found at Hospital, by category, problem description, and frequency, 2002.

Category	Problem description	Frequency	
		N	%
Drug checking and recording	1-Problems related to checking of drugs sent out to the units.	44	46.3
Drug dispensing, distribution, and stocking	1-Wrong drug division: drugs divided for a given unit was found in another unit's basket. 2-Wrong drug distribution. 3-No drug distribution due to lack of prescription forms. 4-No staff for drug checking and delivery. 5-Drug shortages	20	21.0
Drug ordering	1-Drug ordering without using proper prescription forms 2-Inadequate antibiotic order forms. 3-No signature and/or stamp on drug prescription. 4-No cross-checking of the patient's name on the prescription with patients' list in the computer	19	20.0
Staff	1-Staff mismanagement while performing tasks: chatting while working.	7	7.4
Drug knowledge	1-No information on drugs was provided to unit providers	3	3.2
Other	1-Delay in delivering prescriptions due to miscommunication between the pharmacy and the unit	2	2.1
Total		95	100

Table 4. Problems in the process of drug dispensing and distribution found at Hospital D, by category, problem description, and frequency, 2002.

due to drug or staff shortages and delivering the wrong drugs.

Hospital D had problems related to the checking of drugs dispensed and delivered to its units, no proper forms or incomplete prescription forms required for drug dispensing, inadequate prescriptions delivered to the pharmacy, drug shortage, wrong drug distribution, staff nonattendance, among others (Table 4).

In regard to problems associated to the checking of drugs dispensed and distributed, the NCCMERP suggests hospitals should assure routine prescription review by pharmacists before administering the first doses of a drug to patients. Also, any incomplete, illegible, or unclear prescription should be checked before drug dispensing¹⁵. It should be stressed that, in the studied hospitals, no pharmacists were working at the units, which is a general problem at Brazilian hospitals. As a result of the small body of pharmacists available in hospitals, pharmacists are not expected to identify drug allergies, overdosing, sub-dosing, or evaluate drug interactions, but are expected to check what was prescribed against that sent out to the units.

The pharmacist's role has grown worldwide due to increasing complexity of drug treatments. In addition to playing a key role in drug dispensing and distribution, pharmacists have also been engaged in drug purchasing, use and guidance, exchanging knowledge with medical and nursing staff, as well as patients, and getting more involved in drug treatment decision making by answering the providers' questions concerning drug prescription and administration.

In hospitals where they are available, clinical pharmacists are involved in prescription writing and medical rounds, helping out the medical staff with treatment choices and, as a member of the medical team, can easily provide health care providers with information on drug safety¹⁴. The participation of the clinical pharmacist, together with the medical team and nursing staff, brings a differential of quality in assistance given, promoting orientations concerning the use of medications, clarifying doubts, and should

work towards establishing practice standards for hospital care excellence, optimizing drug efficacy, assuring the patient's safety, and minimizing medication errors^{10,14,19}. Hence, the clinical pharmacist should act as a link between drug prescribing and administration. Moreover, they should also be able to identify and check high-risk patients and prevent complications¹⁰.

CONCLUSION

The present study aimed at identifying weaknesses and problems in the process of drug dispensing and distributing that could lead to medication errors at four Brazilian hospitals, and proposed strategies for improving these processes in these settings.

The study findings showed that the processes of drug dispensing and distribution in Brazilian hospitals encounter several problems, mostly associated to work environment conditions and inadequacy of drug ordering and requests. These factors constitute stressors to the health care team, resulting in decreased productivity, delays in processing orders and sending out drugs to the requesting units and, consequently, compromising nursing work and patient care. There is, therefore, a need for improving pharmacy services which will require restructuring the process of drug dispensing and distribution since adequate drug use is closely associated to the quality of all processes of the medication system.

Based on this data and the premise that all medication processes are linked and mutually dependent, we suggest the following strategies to improve the quality of drug dispensing and prevent potential medication errors: 1) Create a multidisciplinary committee to address the patient's safety; 2) Implement computerized prescription systems in hospitals; 3) All hospital pharmacies are required to have a pharmacist available; 4) All hospital pharmacies are required to operate 24 hours a day; 5) Create a better work environment in pharmacies; 6) Implement a unit dose system; 7) Implement drug supply control and bar code dispensing.

REFERENCES

1. Bates D.W., Cullen D.J., Laird N., Petersen L.A., Small S.D., Servi D., Laffel G., Sweitzer B.J., Shea B.F., & Hallisey R. (1995) *J. Amer. Med. Assoc.* **274**: 29-34.
2. Kohn, L.T., J.M. Corrigan & M.S. Donaldson (2000) *"To Err is Human: Building a Safer Health System"*. National Academy Press, Washington (DC), 312 pages.
3. Anacleto, T.A., E. Perini, M.B. Rosa & C.C. César (2005) *Clinics* **60**: 325-32.
4. Beso, A., B.D. Franklin & N. Barber (2005) *Pharm. World. Sci.* **27**: 182-90.
5. Miasso, AM, A.E.B.C. Silva, S.H.B Cassiani, C.R.

- Grou, R.C. Oliveira & F.T. Fakh (2006) *Rev. Latino-am. Enfermagem* **14**: 354-33.
6. Cassiani, S.H.B., A.I. Miasso, A.E.B.C. Silva, F.T. Fakh & R.C. Oliveira (2004) *Rev. Latino-am. Enfermagem* **12**: 781-9.
 7. Miasso, AM, C.R. Grou, S.H.B Cassiani, A.E.B.C. Silva & F.T. Fakh (2006) *Rev. Esc. Enferm. USP* **40**: 524-32.
 8. Hatfield, G. (1999) *Pharmacy Times* **65**: 42-5.
 9. Rolland, P. (2004) *Drug Safety* **27**: 271-82.
 10. Lyra, D.P.Jr., M.C. Prado, J.P. Abriata & I.R. Pelá (2004) *Seguim. Farmacoter.* **2**: 86-96.
 11. Silva, A.E.B.C. (2003) "Análise do sistema de medicação de um hospital universitário do Estado de Goiás", Escola de Enfermagem de Ribeirão Preto/ USP, Ribeirão Preto.
 12. Castro, C.G.S.O. & S.R. Castilho (2004) "Diagnóstico de farmácia hospitalar no Brasil". Fundação Oswaldo Cruz, Rio de Janeiro.
 13. Rosa, M.B. (2003) *Rev. Assoc. Med. Bras.* **49**: 335-41.
 14. Scarsi, K.K., M.A. Fotis & G.A. Noskin (2002) *Am. J. Health-Syst. Pharm.* **59**: 2089-92.
 15. National Coordinating Council for Medication Error Reporting and Prevention [homepage on the Internet]. Rockville: Council recommendation. Recommendations for avoiding error-prone aspects of dispensing medications. [cited 2005 Sept 14]. Available from: <<http://www.nccmerp.org/council/council1999-03-19.html>>.
 16. Thompson, K.K. (2002) *Am. J. Health-Syst. Pharm.* **59**: 667-8.
 17. Young, D. (2002) *Am. J. Health-Syst. Pharm.* **59**: 591-2.
 18. Cina, J. L., T. K. Gandhi, W. Churchill, J. Fanikos, M. McCrea, Patricia; J. M. Rothschild, E. Featherstone; C. Keohane; D.W. Bates & E. G. Poon (2006) *Joint Com. J Qual. Patient Safety* **32**: 73-80.
 19. Silva, A.E.B.C., S.H.B Cassiani, A.I. Miasso & S. P. Opitz (2007) *Acta Paul. Enferm.* **20**: 272-6.