

PROFILE AND ANALYSIS OF PARETO OF THE DISPENSING ERRORS OF A PUBLIC HOSPITAL

Rafaela Sirtoli¹
 Eliz Cassieli Pereira Pinto¹
 Carine Fieira¹
 Jeferson Giovan Volkweis¹
 Suelem Tavares da Silva
 Penteado¹
 Luciane de Fátima Caldeira¹

Introduction: Strategies for evaluation and monitoring of processes subsidize coping with medication errors (ME), which constitute a major part of adverse events (AE) in hospital patients. Many studies concern prescribing and administration errors, but few discuss the impacts of dispensing errors. **Objective:** To describe the profile of dispensing errors and quantify the discrepancies generated by the indicator in a hospital of high complexity. **Methods:** Transversal and retrospective study of dispensing errors avoided by the pharmacist. Once identified, the discrepancies were classified and accounted for, generating an indicator of the work process (number of errors avoided/number of strips dispensed x 100). Subsequently, a Pareto Analysis was performed in order to prioritize problem solving actions. **Results:** A total of 27,980 prescriptions were obtained, which originated 48,451 medication strips. The dispensing errors found were 1,453. The dispensing error rate was 3 errors per 100 strips. The errors that occurred most frequently were lack of medication prescribed and change of medication schedule, representing together 61% of all errors. The same errors were identified in the analysis in the Pareto Diagram as the main intervention targets in process improvement. **Conclusions:** The occurrence of errors found through the indicator "Dispensing Error Index" was considered low, compared to data found in the literature. Through Pareto Analysis, it was possible to identify the most frequent errors, for further planning of improvement actions, in order to increase patient safety.

Keywords: Medication errors; patient safety; indicators of health quality.

1 Universidade Estadual do Oeste do Paraná

Received: 27/02/2018

Revised: 13/06/2018

Accepted: 25/06/2018

INTRODUCTION

The National Patient Safety Program (Programa Nacional de Segurança do Paciente, PNSP) was established in Brazil in 2013 with the aim of promoting safe practices in health facilities. Through the establishment of protocols, this aims to ensure patient safety by inserting new strategies for improving health care.¹

Among the protocols established by the PNSP is the "Safety Protocol on Prescription and Use and Administration of Medicines", with the purpose of establishing measures that minimize the occurrence of medication errors at all stages of the therapeutic chain.² Medication errors (ME) constitute a major part of adverse events (AE) in hospital patients.³ A systematic review published in 2008 evidenced the magnitude of errors associated with medication in the context of AE, constituting the second most prevalent type among the events listed by the research.⁴ In addition to the potential harm to the individual, additional treatment costs should also be considered as a result of an increase in length of hospital stay and possible complications.⁵

In this sense, the establishment of strategies for evaluation and monitoring of processes subsidizes coping with potential errors related to medications.^{6,7} Among the tools recommended by the Ministry of Health are health indicators, defined as data or numerical information that quantify, among other variables, the performance of processes and the organization as a whole.⁸

MS can be defined as any preventable event that, in fact or potentially, can lead to inappropriate

medication use. This concept implies that inappropriate use may or may not harm the patient. Such events may be related to several stages of health care, including prescription, dispensing, administration.⁹⁻¹⁰

However, most of the research concerns prescribing errors and administration,¹¹ while few studies are published on dispensing errors in Brazil and in the world.

In addition, it is relevant to identify the category of ME, as well as its determinants, in order to direct coping strategies to prevent them.²

The objective of the present study was to describe the profile of dispensing errors in a pharmacy of a tertiary hospital in the State of Paraná, by quantifying and classifying them by the error rate indicator in the pre-dispensing medication conference and, through Pareto analysis, subsidize management actions to improve processes.

METHODS

This is a cross-sectional and retrospective study of dispensing errors that were avoided through the institution of the medication strip conference by the hospital pharmacist.

The study was carried out in a Public Hospital in the west of Paraná at the tertiary level, with care only SUS and capacity for 195 beds, financed by the State and Federal Government.

The Pharmacy Service of the present study registers as errors of dispensing the deviations that occur during the separation, low electronics, preparation of strips and dispensing of medicines.

How to cite this article:
 Sirtoli R, Pinto ECP, Fieira C, Volkweis JG, Penteado STS e Caldeira LFC. Perfil e análise de pareto dos erros de dispensação de um hospital público. Rev. Bras. Farm. Hosp. Serv. Saúde, 9(2): pag-pag, 2019.
 Doi: 10.30968/rbfhss.2018.092.007

Corresponding Author:
 Rafaela Sirtoli
 Universidade Estadual do Oeste do Paraná, Av. Tancredo Neves, 3224 - Santo Onofre, Cascavel - PR, Brasil. CEP: 85806-470
 rafaela.sirtoli@hotmail.com

The pharmaceutical service of the present institution begins with the analysis of the prescriptions, followed by the separation of the prescription medications, low electronics and confection of the strips. The distribution system is of the individualized type, in which strips are provided per period, for each patient. The prescriptions are valid for 24 hours, thus generating three strips: morning, afternoon and night, these being made concomitantly.

The strip conference was deployed at the hospital's pharmacy service in 2012. Before dispensing to the nursing team, the morning and evening shifts of the following hospitalization sectors are checked by the pharmacist: Medical and Surgical Clinic; Maternity; Pediatrics; Adult Intensive Care Unit (ICU); and Orthopedics and Neurology.

The strips dispensed in the afternoon shift were not counted in the present study, since, due to the logistics of the service, they do not go through the pharmacist's conference.

During the conference process, the pharmacist assesses possible discrepancies between the strip, previously made by the hospital pharmacy service, and the corresponding prescription. Once identified, the discrepancies are classified according to their category, in order to generate an indicator of the work process. Since the conference was implemented as an additional barrier to medication errors, the observed inconsistencies are forwarded to the correction and subsequently waived.

The Indicator of the present study was denominated "Index of Dispensations Errors". The numerator of the indicator formula consists of the total number of errors identified during the conference, while the denominator is represented by the total number of strips made. The result obtained is expressed in the power of ten, generating an Error/Strip index.

The methodology for categorizing errors was based on the classification according to *The National Coordinating Council for Medication Error Reporting and Prevention* (NCCMERP) being adapted to the local reality. Based on this, errors of dispensation were considered: lack of identification of the patient; exchange of medication; lack of medication; dose error – overdose or subdose; exchange of hours and exchange of pharmaceutical form.

As for the statistical technique used, the Pareto Diagram was applied in order to guide decision making. This allows you to select and prioritize a small number of factors that have a major impact on process improvement. The Pareto Principle is based on the idea that 80% of the results correspond to only 20% of the factors, justifying the prioritization.

The data originated between the period from January 1 to December 31, 2015 were analyzed. Tabulation and statistical analysis were performed in Microsoft Excel® 2013 Software. The errors were classified according to their category and assessed for frequency distribution. Subsequently, a Pareto Analysis was performed in order to prioritize actions for problem solving. The study was approved by the Research Ethics Committee (REC), under opinion No. 1,872,685.

RESULTS AND DISCUSSION

A total of 27,980 prescriptions were obtained, which originated 48,451 medication strips during the study period. The dispensing errors encountered during the conference of the strips by the pharmacist amounted to 1,453. The dispensing error rate was 3 errors per 100 strips.

For the discussion, it is important to consider that, although research on dispensing errors in Brazil has been gaining ground in recent years, literature on the subject is still scarce. Therefore, the comparison between the results should be cautious, since there is a great divergence in the applied methodologies and in the expression of the results. In addition, it is worth emphasizing the difference between the scenarios and pharmaceutical services already studied, which further complicates the context of comparison.

To date, no studies using a methodology like the present study (indicator expressed in index) have been identified, since the construction of the indicator was based on the local reality - where the number of errors per strip is calculated, not the number of errors due to dispensed medications - making their expression unfeasible.^{7,12,13}

Although they could not be compared directly, in a hypothetical conversion, the rate found (3%) would be much lower than the literature reports, considering that the denominator would increase exponentially if the number of medications contained in each strip were considered in

detriment of the denominator used - error for a strip unit.

Such result may be related to the separation system employed in the pharmacy studied. It is believed that the fact that each step in the process (separation of prescribed medications, low electronics and dressing) by a different employee may constitute an additional barrier to the occurrence of errors prior to the pharmaceutical conference.

The classification of errors is given in Table 1. The errors that occurred most frequently were "lack of medication" and "medication schedule change", representing together 61% of all errors. It is noteworthy that the term "lack of medication" refers to the lack of it in the strip checked, and there is no lack of the medication in the institution.

Table 1. Classification and incidence of dispensing errors by hospitalization sector.

Classification of errors	Adult ICU	Medical and Surgical Clinic	Orthopedics / Neurology	Pediatrics	Maternity	Total	%
Lack of medication	54	146	102	59	88	449	31%
Medication schedule change	40	181	112	55	51	439	30%
Dose Error - Subdose	30	61	41	33	21	186	13%
Dose Error - Overdose	26	44	30	32	21	153	11%
Medication change in package	8	39	46	22	13	128	9%
Pharmaceutical form change	7	24	17	7	15	70	5%
Lack of identification	3	8	9	4	4	28	2%
Package change on schedule	0	0	0	0	0	0	0%
TOTAL	168	503	357	212	213	1453	
%	11	35	25	14	15	100	

A study conducted by Galvão et al. (2012), corroborates with the results found, in which "lack of medication" was the main error observed in the dispensation (41.66%). Similar rate was described in the Albuquerque et al. (2016) where omission of doses represented 35.93% of the errors. These findings point to a fragility in the stage of separation of prescribed medications, indicating a need to revise this routine.^{12,14}

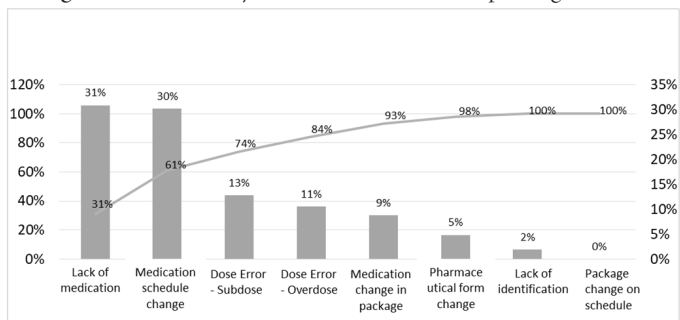
On the other hand, the second most frequent error - timetable change of the medication (30%) – reflects a deficiency in the final stage of the process, since it is only at the time of making the strips that the medications are segregated per shift, favoring occurrence of such failure in the process. Thus, we can explain the disparity of results with those found in the literature, where this type of error is not so prevalent. In studies where the medications are separated by administration time, the rates found were about twice as low as those described above.^{13,14}

Once the Pareto Analysis was applied, the errors were lack of medication and change of the medication schedule as the main intervention targets (Figure 1).

Although less frequent, the errors of dose – sub or overdose – also contribute to the totality of 80%, according to Pareto Principle. However, if the two major factors are resolvable, more than half of the errors will be prevented.

Thus, the Pareto Analysis has proved to be a useful and practical management tool in directing actions to improve the dispensing processes.

Figure 1 - Pareto analysis for the incidence of dispensing errors.



CONCLUSIONS

We observed that the occurrence of dispensing errors found through the Dispensing Errors Index indicator was low. Through the Pareto Analysis, it was possible to verify that the four most frequent errors correspond to more than 80% of the errors of dispensation found, being: Lack of medication; Change of medication schedule; Dose error - subdose; and Dose-overdose error. Therefore, these should be prioritized in the planning of improvements in the process in order to avoid their occurrence.

Also, health indicators – like the one used in this study – are important tools for process evaluation. However, it is worth emphasizing that these are tools for targeting, necessitating the joint implementation of different coping strategies, such as the barriers used in the hospital pharmacy service studied.

Finally, medication errors, while avoidable events, are amenable to interventions. In this sense, the results of the present study can subsidize the planning of improvement actions, in view of greater patient safety.

Finalcial Support

The research did not receive financing for its realization.

Conflict of Interests

The authors declare no conflicts of interest.

Autors' Contributions

RS, ECPP, CF and JGV: design and planning of the project; analysis and interpretation of data; writing the article; approval of the final version and are responsible for the accuracy of the information and integrity of any part of the work.

STSP e LFC: Conception and planning of the project in research; relevant critical review of intellectual content; final approval of the version to be published; responsibility for all work information, ensuring the accuracy and completeness of any part of the work.

REFERENCES

1. Brasil. Ministério da Saúde. Portaria nº 529, de 1º de abril de 2013. Institui o Programa Nacional de Segurança do Paciente (PNSP). Diário Oficial da União, Brasília, DF, 2 abr. 2013. Seção 1, p. 43.) Disponível em: < http://www.cvs.saude.sp.gov.br/up/U_PT-MS-GM-529_010413.pdf> Acesso em: 30 nov. 2016.
2. Brasil. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Fundação Oswaldo Cruz. Fundação Hospitalar do Estado de Minas Gerais. Protocolo de segurança na prescrição, uso e administração de medicamentos, 2013. Disponível em: <http://www.hospitalsantalu-cinda.com.br/downloads/prot_meficamentos.pdf> Acesso em: 30 nov. 2016.

3. Bates DW, Boyle DL, Vander Vliet MB et al. Relationship between medication errors and adverse drug events. *J Gen Intern Med*, 1995,10(4):199-205.
4. De Vries EN, Ramrattan MA, Smorenburg SM et al. The incidence and nature of in-hospital adverse events: a systematic review. *Quality & Safety in Health Care*, 2008, 17(3):216-223.
5. Silva AEBC, Cassiani SHDB. Análise prospectiva de risco do processo de administração de medicamentos anti-infecciosos. *Rev Lat Am Enfermagem*, 2013, 21:233–41
6. Langebrake C, Hilgarth H. Clinical pharmacists' interventions in a German University Hospital, *Pharm World Sci*, 2010, 32:194-199.
7. 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. Boletim Informativo ISMP Brasil, maio 2016, v. 5, n. 1.
8. Fundação Prêmio Nacional da Qualidade. Rumo à excelência: critérios para avaliação do desempenho e diagnóstico organizacional. São Paulo: Fundação Nacional da Qualidade, 2005.
9. National Coordinating Council for Medication Error Reporting and Prevention. Taxonomy of medication errors – 1998-1999 [online]. Disponível em: <<http://www.nccmerp.org/about-medication-errors>> Acesso em: 12 jun. 2018.
10. American Society of Healthy-System Pharmacists. Suggested definitions and relationships among medication misadventures, medication errors, adverse drug events, and adverse drug reactions. *Am J Health Syst Pharm*, 1998, 55(2):165-6.
11. James KL, Barlow D, Mcartney R et al. Incidence, type and causes of dispensing errors: a review of the literature. 2009;9–30.
12. Albuquerque PMS, Dantas JG, Vasconcelos LA et al. Identificação de erros na dispensação de medicamentos em um Hospital Oncológico. *Rev. Bras. Farm. Hosp. Serv. Saúde*, 2012, 3(1):15-18.
13. Rissato MAR. Erros de dispensação de medicamentos em hospital universitário no Paraná [tese]. São Paulo: Faculdade de Saúde Pública; 2012. Disponível em <<http://www.teses.usp.br/teses/disponiveis/6/6135/tde-17052012-120257/pt-br.php>> Acesso em: 20 dez 2016.
14. Galvão AL, Oliveira AM, Carvalho FB et al. Identificação e distribuição dos erros de dispensação em uma farmácia hospitalar: um estudo comparativo no município de Salvador Bahia. *Rev. Ci. Med.Biol*, 2012, 11(2):201-206.