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COSTS AND ROOT CAUSES OF MEDICATION ERRORS AND FALLS IN A TEACHING HOSPITAL: CROSS-SECTIONAL STUDY

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ABSTRACT

Objectives: to characterize accidents/falls and medication errors in the care process in a teaching hospital and to determine their root causes and variable direct costs.
Method: cross-sectional study implemented in two stages: the first, was based on the analysis of secondary sources (notifications, medical records and cost reports) and the second, on the application of root-cause analysis for incidents with moderate/severe harm. The study was carried out in a teaching hospital in Paraná, which exclusively serves the Brazilian Unified Health System and composes the Network of Sentinel Hospitals. Thirty reports of accidents/falls and 37 reports of medication errors were investigated. Descriptive statistical analysis and the methodology proposed by The Joint Commission International were applied.
Results: among the accidents/falls, 33.3% occurred in the emergency room; 40.0% were related to the bed, in similar proportions in the morning and night periods; 51.4% of medication errors occurred in the hospitalization unit, the majority in the night time (32.4%), with an emphasis on dose omissions (27.0%) and dispensing errors (21.6%). Most incidents did not cause additional harm or cost. The average cost was R$ 158.55 for the management of falls. Additional costs for medication errors ranged from R$ 31.16 to R$ 21,534.61. The contributing factors and root causes of the incidents were mainly related to the team, the professional and the execution of care.
Conclusion: accidents/falls and medication errors presented a low frequency of harm to the patient, but impacted costs to the hospital. Regarding root causes, aspects of the health work process related to direct patient care were highlighted.

DESCRIPTORS: Patient safety. Accident due to falls. Medication error. Medical errors. Cost and cost analysis. Root cause analysis.

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CUSTOS E CAUSAS-RAÍZES DE ERROS DE MEDICAÇÃO E QUEDAS EM HOSPITAL DE ENSINO: ESTUDO TRANSVERSAL

RESUMO

Objetivos: caracterizar os acidentes/quedas e erros de medicação no processo de cuidado em um hospital de ensino e; determinar suas causas-raízes e os custos diretos variáveis.
Método: estudo transversal implementado em duas etapas: a primeira, se pautou na análise de fontes secundárias (notificações, prontuários e relatórios de custos) e; a segunda, na aplicação de análise de causa-raíz para incidentes com danos moderados/graves. Realizado em hospital de ensino do Paraná, que atende exclusivamente o Sistema Único de Saúde e compõe a Rede de Hospitais Sentinelas. Foram investigadas 30 notificações de acidentes/quedas e 37 de erros de medicação. Aplicaram-se a análise estatística descritiva e a metodologia proposta pela *The Joint Comission International*.
Resultados: dentre os acidentes/quedas,33,3% ocorreram no pronto socorro;40,0% tiveram relação com o leito, em proporções semelhantes nos períodos matutino e noturno;51,4% dos erros de medicação ocorreram em unidade de internação, a maioria no período noturno (32,4%), com destaque para omissões de dose (27,0%) e erros de dispensação (21,6%). A maioria dos incidentes não ocasionou danos ou custo adicional. O custo médio foi R$ 158,55 para manejo das quedas. Os custos adicionais para erros de medicação variaram entre R$ 31,16 e R$ 21.534,61. Os fatores contribuintes e causas-raízes dos incidentes se relacionaram, principalmente, à equipe, ao profissional e à execução do cuidado.
Conclusão: os acidentes/quedas e erros de medicação apresentaram baixa frequência de danos ao paciente, porém impactaram no custo hospitalar. Em relação às causas-raízes, destacaram- se os aspectos do processo de trabalho em saúde, relacionados ao cuidado direto ao paciente.

DESCRITORES: Segurança do paciente. Acidentes por quedas. Erro de medicação. Erros médicos. Custo e análise de custo. Análise de cauza-raíz.

COSTOS Y CAUSAS PRINCIPALES DE LOS ERRORES Y CAÍDAS DE MEDICACIÓN Y CAÍDAS EN UN HOSPITAL DOCENTE: UN ESTUDIO TRANSVERSAL

RESUMEN

Objetivos: caracterizar accidentes/caídas y errores de medicación en el proceso asistencial en un hospital universitario y; determinar sus causas fundamentales y los costos directos variables.
Método: estudio transversal implementado en dos etapas: la primera, basada en el análisis de fuentes secundarias (notificaciones, historias clínicas e informes de costos) y; el segundo, en la aplicación del análisis raíz-raíz para incidentes con daños moderados / severos. Realizado en un hospital docente de Paraná, que atiende exclusivamente al Sistema Único de Salud y forma parte de la Red de Hospitales Centinelas. Se investigaron 30 notificaciones de accidentes / caídas y 37 de errores de medicación. Se aplicó el análisis estadístico descriptivo y la metodología propuesta por The Joint Commission International.
Resultados: entre los accidentes / caídas, el 33,3% ocurrió en urgencias;40,0% estaban relacionados con la cama, en proporciones similares en los periodos de mañana y noche; El 51,4% de los errores de medicación ocurrieron en la unidad de internación, la mayoría durante la noche (32,4%), con énfasis en omisiones de dosis (27,0%) y errores de dispensación (21,6%). La mayoría de los incidentes no resultaron en daños o costos adicionales. El costo promedio fue de R$ 158,55 para el manejo de caídas. Los costos adicionales por errores de medicación oscilaron entre R$ 31,16 y R$ 21.534,61. Los factores contribuyentes y las causas fundamentales de los incidentes se relacionaron principalmente con el equipo, el profesional y la ejecución de la atención.
Conclusión: los accidentes / caídas y los errores de medicación tuvieron una baja frecuencia de daño al paciente, pero impactaron los costos hospitalarios. En relación a las causas raíz, se destacaron aspectos del proceso de trabajo en salud, relacionados con la atención directa al paciente.

DESCRIPTORES: Seguridad del paciente. Accidentes por caídas. Error de medicación. Errores médicos. Análisis de costos y costos. Análisis raíz-raíz.

INTRODUCTION

The theme of patient safety gained worldwide notoriety after the publication of the report "*To err is human*", prepared by the Institute of Medicine (IOM) of the National Academy of Medicine of the United States of America (USA), in the late 1990s.[1] Among other aspects, this document evidenced the impact of care failures on hospital stay, incidence of physical disabilities and cost of health care.

Even after the global alert promoted by the IOM report and the subsequent campaigns of the World Health Organization (WHO), with the objective of favoring the development of public policies in the field of patient safety [1], recent data show that care incidents remain a serious public health problem, due to the thousands of patients who are victims of unsafe practices and/or low quality of care.[2]

In order to monitor the worldwide mobilization for the promotion of harm-free health care, the Brazilian Ministry of Health (MS) established the National Patient Safety Program (NPSP)[3], through Ordinance No. 529/2013, which aims to qualify health care. However, in the national context, the identification of factors that contribute negatively to the implementation of patient safety strategies, such as a lack of human resources and support of senior management, among others, is recurrent.[4]

Among the main incidents related to health, those related to nursing care such as medication errors, pressure injuries, accidents/falls, infections, losses or inadequate use of medical-hospital devices, low adhesion to hand hygiene and others are highlighted.[5–7]

Some studies indicate categories of incidents of greater relevance for nursing care, responsible for significant financial and social impact, represented by accidents/falls and failures in any stage of the medication chain.[5–7]

Accident/fall rates are considered significant indicators of quality of care, as they reflect the adequacy of care processes and existing structural/material resources for the prevention of AEs.[8] Regarding accidents/falls, studies indicate incidence ranging from 1.3 to 2.6 falls/1000 patient-day, and in about 43% of cases, harm to the patient is evidenced.[8,9] In turn, drug incidents characterize the quality of care more broadly because the drug chain consists of multisectoral stages and has an outcome in nursing care, with the administration of medications to the patient.[10]

The harm resulting from AEs in care causes consequences for the patient as the clinical condition worsens and also for the institution, in the form of losses in its image, ethical-legal issues and increase in hospital treatment costs.[8] WHO data estimates that drug errors cost health services around the world about US$ 42 billion a year, while the falls burden health systems with a contribution of approximately US$ 120 million per year.[11–12]

Given the above and considering the complexity of accidents/falls and medication errors, it is important to clarify the care failures that predispose the occurrence of these incidents, as well as to characterize the harm and financial consequences that impact the health organization, so that, from this, it is possible to appropriately allocate resources for the implementation of preventive actions that ensure the safety of care and the improvement of care quality.

Therefore, this study aims to characterize accidents/falls and medication errors in the care process in a teaching hospital and to determine its root causes and variable direct costs.

METHOD

This is a two-step cross-sectional study. The first step which uses a quantitative, analytical approach, is based on data from primary sources (notifications, medical records and cost reports) and the second, descriptive-exploratory approach is focused on the identification of contributing factors and root causes of incidents that resulted in severe harm to the patient.

The study was conducted in a teaching hospital, located in the State of Paraná, which acts as a reference center in high regional complexity for the Unified Health System (SUS), the health demands of more than 250 municipalities in Paraná, with 300 hospitalization beds, an average of 1,000 hospitalizations/month and 15,000 care/month in 2019. The institution is part of the Sentinel Hospitals Network of the National Health Surveillance Agency (ANVISA) and the Patient Safety Center (PSC) which was formally established and active since 2015.

Considering the limited study period, it was decided not to apply sample sizes to the population, thus, all reports of accidents/falls and medication errors referred to the PSC of the institution from January 1 to June 30, 2019 were included in the study, referring to incidents that occurred with patients over 18 years of age in the inpatient units (medical-surgical clinic, maternity and burn treatment center), intensive care (general and specialized in burned patients), accident and emergency and surgical center.

Data collection in the first stage occurred in a retrospective manner, performed between July and December 2019, due to the period of processing notifications by the PSC for the first half of the same year. An instrument elaborated by the researcher and validated by the coordinator of the PSC of the institution, a higher education professional, graduated in nursing, was used as a support tool. This instrument is composed of items of sociodemographic and clinical characterization of patients and data regarding the incident, commodities and services related to it. After analyzing the notifications for the characterization of the incidents, the patients' medical records were evaluated in full, for the purpose of the characterization of the victims, complementation of data regarding the incident, report of information on harm, supplies and services necessary for the management of the incident.

This study adopted the key concepts established in the WHO International Classification for Patient Safety, which also make up the theoretical basis of the NPSP, which defines: *adverse event* - any incident that results in patient harm; *incident without harm* - the one that effects the patient, but there was no finding of harm and; *near miss* - potential incidents that did not affect the patient.[13]

Also with regard to the conceptual basis, we used the harm stratification proposed by the WHO that classifies the impact of the incident on the patient as: *mild harm* - presence of mild symptoms, without the need for intervention and/or with loss of minimum and short-term function; *moderate harm* – presence of evident symptoms that require intervention, with possible interference in hospital stay and/or loss of long-term function and; *severe harm* – presence of obvious symptoms, which require intervention to maintain life and/or cause long-term, permanent loss of function or death.[13]

In order to determine the costs derived from accidents/falls and medication errors, the data collection of the first stage also included the analysis of reports of supplies and services, provided to patients, victims of incidents, as well as hospital cost reports issued by services in the administrative support area of the institution. In this study, the costs of medical-hospital material and medications (MAT.MED), laboratory tests (LAB) and radiological examinations (EXA) directly related to interventions resulting from the incidents under study were considered.

For the second stage of the study, characterized by the investigation of the root causes of the incidents, the decision was made to submit (RCA) only two incidents that resulted in moderate to severe harm to the victim patients to the RCA process, according to the methodology proposed *by The Joint Commission International* (JCI).[12] The selection of incidents submitted to the analysis was also validated by the members of the PSC, since they are responsible for the evaluation of notifications and final classification of reported incidents.

Data collection of the second stage was performed through RCA sessions promoted in medical-surgical hospitalization units in December 2019, with the participation of nursing professionals (nursing technicians and nurses), with the inclusion criterion of working in the unit longer than six months. The selection of hospitalization units (Male Unit and Female Unit) for implementation of the RCA process occurred based on the indication of the PSC, since in these units the largest number of professionals in statutory work regime and with longer service time in the institution was crowded. According to the JCI recommendation regarding the composition of the RCA team, the participation of professionals with experience and fundamental knowledge about the incident under analysis should be prioritized.

The RCA sessions lasted from 30 to 60 minutes and were performed during 12-hour shifts, with the consent of the Head of Nursing and coordination of the PSC. All were asked to read and sign the Informed Consent Form (ICF), before the start of each RCA session. To assist in gathering information during the discussions, the Cause-Effect Diagram or Ishikawa Diagram was used as a tool, which contributes to the organization in the process of surveying related factors and root causes of AEs. We opted for the audio recording of the sessions, in order to facilitate the recording of the discussions and subsequent summary of the results.

The data from the analytical stage were tabulated in Microsoft Excel software® spreadsheets and analyzed with the help of the application software SPSS 2.0 - Statistical Package for the Social Sciences, version 21. The final results were organized in tables and charts; the characterization variables were presented in absolute (n) and relative (%) and/or by means of central trend and dispersion measures. To test possible associations between the independent variables (age group, shift and type of output) and dependent variables (type of fall and medication error), the Chi-square association test was applied, with significance level of $p<0.05$.

In order to detail the characteristics of the incidents and their direct costs, we opted for the use of descriptive tables. The analysis of the data of the descriptive-exploratory stage was performed based on the steps *proposed* by the *JCI* in the guide *"Root Cause Analysis in Healthcare: Tools and Techniques*": (1) definition of the problem; (2) determination of the facts; (3) identification of contributing factors - immediate causes); (4) identification of other contributing factors - underlying causes; (5) systematization of immediate and underlying causes; (6) identification of root causes; (7) refinement of root causes and (8) root-cause systematization.[14]

To finalize the root cause analysis process, the RCA team evaluated each of the causes raised, classifying them as root causes or contributing factors for the occurrence of the incident.

This investigation complied with all the ethical and legal precepts established by Resolution Nº. 466/2012 of the National Health Council.

RESULTS

The set of accident/fall notifications was composed of 30 incidents, in equal proportions in relation to the sex of the patients, with 15 patient victims (50.0%) male and female. The mean age of the victim patients was 54.3±15.9 years, ranging from 21 to 86 years. The mean length of hospital stay was 15.5 ± 17.0 days (minimum of 1 and maximum of 79 days).

Regarding the set of notifications for medication errors, 37 incidents were analyzed, 20 male victim patients (54.1%) with a mean age of 56.3±20.5 years, ranging from 18 to 87 years. For patients who were victims of medication errors, the mean length of hospital stay was 27.6 ± 25.2 days (minimum of 1 and maximum of 119 days).

No significant associations were found between the variable independent age group, work shift in which the patient's event and type of event occurred, or the dependent variables type of accident/fall (p=0.29, p=0.07 and p=0.53) or type of medication error (p=0.89, p=0.06 and p=0.06), respectively

Table 1 shows data on the general characterization of accidents/falls and medication errors.

Table 1 – Characterization of accidents/falls and medication errors in the period from January to June, Londrina, PR, Brazil, 2019. (n=67).

Variable	Accidents/falls Total=30	Medication errors Total=37
	n (%)	n (%)
Inpatient unit		
Men's Unit	9 (30.0)	4 (10.8)
Women's Unit	7 (23.3)	19 (51.4)
Infectious Diseases Unit	1 (3.3)	0 (0.0)
ICU/Burns ICU*	1 (3.3)	6 (16.2)
Burns†	1 (3.3)	1 (2.7)
Emergency Unit	10 (33.3)	5 (13.5
Maternity	1 (3.3)	1 (2.7)
Surgical Center	0 (0.0)	1 (2.7)
Final classification of the incident		
Near miss	0 (0.0)	10 (27.0)
Incident without harm	22 (73.3)	21 (56.8)
Adverse event	8 (26.7)	6 (16.2)
Type of fall		
Bed	12 (40.0)	Na
Bathroom	6 (20.0)	Na
Own height	10 (33.3)	Na
Other	2 (6.7)	Na
Type of medication error		
Wrong medicine	Na	8 (21.6)
Dose omission	Na	10 (27.0)
Wrong dose	Na	2 (5.4)
Wrong pharmaceutical form	Na	1 (2.7)
Wrong administration technique/route	Na	2 (5.4)
Wrong administration speed	Na	1 (2.7)

Table 1 – Cont.

Variable	Accidents/falls Total=30	Medication errors Total=37
	n (%)	n (%)
Wrong administration time	Na	1 (2.7)
Wrong patient	Na	6 (16.2)
Other	Na	6 (16.2)
Shift		
Morning	10 (33.3)	9 (24.3)
Evening	8 (26.7)	11 (29.7)
Night	9 (30.0)	12 (32.4)
Degree of harm		
Mild	6 (20.0)	3 (8.1)
Moderate	2 (6.7)	2 (5.4)
Serious	0 (0.0)	1 (2.7)
No harm	22 (73.3)	31 (83.8)
Presence of admission cost		
Yes	7 (23.3)	3 (8.1)
No	23 (76.7)	34 (91.9)

*ICU/Burns ICU: Intensive CareUnit/Burns Intensive Care Unit; †CTQ: Burn Treatment Center.

As shown in Table 1, there was a low incidence of additional costs related to the management of the incidents under study, and no tests of association between the variable cost and the types of falls or medication errors were performed. Thus, for this study, it was decided to present the costs related to the management of incidents individually, including those classified as incidents without harm and adverse events, as shown in Chart 1.

The cases of accidents/falls presented an average of R$ 158.55 of additional costs for their management, ranging from R$ 20.40 to R$ 275.38; with emphasis on the average cost with radiological examinations that was R$ 151.90, ranging from R$ 15.30 to R$ 262.65. On the other hand, the additional costs for medication error cases were higher, ranging from R$ 31.16 to R$ 21,534.61. The latter was the total value with variable direct costs of the only drug incident with severe harm to the patient that resulted in a long period of ICU hospitalization.

There were no cases of accidents/falls with severe harm. Thus, we opted for the analysis of a moderate harm event, which occurred with a neurosurgical patient during ICU hospitalization, which resulted in a fracture of the proximal phalanx of the second finger of the left hand, diagnosed only after hospital discharge, during outpatient return for follow-up with the neurosurgical clinic. The results for the RCA process are described in Chart 2.

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Chart 1 – Accidents/falls and medication errors with additional cost in the period from January to June, Londrina, PR, Brazil, 2019.

Case	Sex*	Age	Unit†	Shift‡	Type of error	Class. final§	Harm‖	Cost			
								Food. With	LAB	EXA	Total
Case 1	M	39	ICU	M	Fall from the bed	AE	Mod	R$ 3.32	-	R$ 15.30	R$ 18.62
Case 2	M	69	ER	A	Fall from own height	AE	Mod	R$ 12.73	-	R$ 262.65	R$ 275.38
Case 3	F	67	Men	A	Equipment fall	AE	Mild	R$ 7.68	-	R$ 22.95	R$ 30.63
Case 4	F	52	ER	N	Fall from the bed	AE	Mild	R$ 9.64	-	R$ 247.35	R$ 256.99
Case 5	M	86	ER	A	Fall from own height	AE	Mild	R$ 13.13	-	R$ 247.35	R$ 260.48
Case 6	F	82	Fem	N	Fall from the bed	IWH	-	-	-	R$ 20.40	R$ 20.40
Case 7	M	54	Men	A	Fall from own height	IWH	-	-	-	R$ 247.35	R$ 247.35
Case 8	M	73	SC	N	Wrong dose	AE	S	R$ 9.257,63	R$ 8.267,28	R$ 4.009,70	R$ 21,534.61
Case 9	F	31	ICU	N	Dose omission	AE	S	R$ 33.16	-	-	R$ 31.16
Case 10	F	30	Matern	N	Dose omission	AE	Mod	R$ 17.71	R$ 199.92	R$ 247.35	R$ 464.98

*Sex - M: male; F: female; †Unit - CC: Surgical Center; PS: Emergency Room; Men: Male Unit; Fem: Women's Unit; ICU: Intensive Care Unit; Matern: Maternity; ‡Shift - M: morning; A: afternoon; N: nightly; §Final classification - EA: adverse event; ISD: incident without harm; || Degree of harm - M; mild; Mod: moderate; G: severe; ¶Cost - MAT. MED: medical-hospital material and medicines; LAB: laboratory tests; EXA: radiological examinations.

Chart 2 – Contributing factors and root causes of accidents/falls with moderate harm and medication errors with severe harm, period from January to June, Londrina, Paraná, Brazil, 2019.

Categories	Accidents/falls		Medication errors	
	Contributing factors	Root causes	Contributing factors	Root causes
Task	Absence of protocol for the use of containments/ restrictions; inadequate periodicity of the risk assessment of fall (Morse scale).	-	Inadequate reading/ checking of the medical prescription; absence of a protocol for the prescription, preparation and administration of medicines; absence of questioning/control of dispensing medications by the pharmacy.	Inadequate monitoring of the action of the medication on the neurological status of the patient (considering the characteristics of the patient).
Patient	Clinical conditions of the patient (altered level of consciousness, disorientation and psychomotor agitation).	-	Extreme age (>70 years); comorbidities (alcohol consumption); effect of anesthetic drugs in the immediate postoperative period; clinical conditions of the patient (post TAND, postoperative, altered level of consciousness).	-
Team	Absence of prescription of sedative medication for agitation control if necessary.	Failure to supervise the nursing technician regarding the installation of patient restraint/ restriction.	Failure to supervise nursing technician in the drug administration procedure.	Ineffective communication between nursing, medicine and pharmacy professionals; over-reliability to medical guidelines/conduct.
Environment	Work overload of the nursing team.	-	Work overload of the nursing team.	-
Individual	Failure to direct patient supervision after sedation suspension.	Nº patient restraint/ restriction	Inexperience or failure of professionals' knowledge about the maximum dose of medication.	-
Management	-	-	-	-

DISCUSSION

For the two types of incidents analyzed, the patient victims had a mean age of around 50 years, ranging from 21 to 86 years for accidents/falls and 18 to 87 years for medication errors. Regarding the age of patient-victims of accidents/falls, the results differ from the literature in general, which states that there is a higher incidence of falls in individuals with a mean age greater than 65 years.[8,9,15] However, recent evidence has indicated similar profiles to this study, as it indicates a mean age between 42 and 55 years.[16–17]

It is important to state that there was no difference regarding the gender of the patients, because there were equal proportions for both sexes of cases of accidents/falls (50.0%) and slight variation in the proportion of male patients in cases of drug incidents (54.1%). In this respect, the literature does

not present reports that indicate a significant association of the variable sex with the occurrence of incidents related to health care. However, with regard to falls, there are studies that address a greater number of falls in male patients.[15–17]

When analyzing the cases of accidents/falls, it is noted that the majority of patients were allocated in the Emergency Room (33.3%), followed by male (30.0%) and female (23.3%) hospitalization units. It was also found that accidents/falls occurred in similar proportions in the morning (33.3%) and night (30.0%) periods.

Regarding the relationship between the hospitalization unit and the incidence of AE, a study conducted in a general hospital in the south of the country found a higher incidence of falls in its accident and emergency services, when compared to hospitalization units, with 2.6 *versus* 1.7 falls/1,000 patient-days, however, there is still a scarcity of studies on the subject of fall in an emergency unit.[8,18]

With respect to the shift in which the incidents categorized as accidents/falls are concentrated, studies have highlighted the predominance of this type of event at night, a circumstance favored by a deficit in the constant direct supervision, either by the nursing team or by a companion/family member, associated with overestimation of the patient regarding his physical capacities or, even, the embarrassment in asking for help from professionals to perform basic activities, such as going to the bathroom or drinking water.[8]

Regarding medication errors, these occurred predominantly in the female hospitalization unit (51.4%) and were concentrated in the night (32.4%) and afternoon (29.7%) periods. Medication errors are considered the most common in the practice of health care and despite the extensive literature on the subject, it is perceived that there is a lack of evidence about the correlation between drug incidents and the profile of the units which have higher occurrences.[19] This is a gap that deserves attention from researchers and professionals in the field because, in general, the evidence on the mapping of the profile of hospital units is related to studies focusing on specific units such as intensive care unit/ semi-intensive care, neonatology and/or pediatrics.[20–22]

Regarding the shift in which the incidents occur, a study conducted in intensive/semi-intensive care units in the city of São Paulo obtained partially divergent results from the results of this study because the authors reported that drug incidents were more frequent in the afternoon and morning periods.[21]

In both categories of the analyzed incidents, the absence of harm to the patient was predominated and when these were detected, most were classified as mild. Only one case of medication error resulted in severe harm to the patient and the most serious consequences of accidents/falls were classified as moderate. The data of this study corroborate the findings of the literature that highlight the absence of harm related to accidents/falls and, in the presence of some type of injury, those classified as mild harm prevail.[8:9,23]

Regarding the specific classification for each category of incident, it was found that the majority of falls were related to falls from beds (40.0%), followed by a fall from one's own height (33.3%), which characterizes a divergent profile of other studies on this type of event, in which falls from their own height predominated, whose frequency varies between 52.4% and 63.4%, followed by incidents with falls from bed or in the bathroom. [8:9,23]

For medication errors, errors due to dose omission (27.0%) were highlighted by dispensing the wrong medication (21.6%) and also by wrong patient (16.2%). The results found in this study corroborate the findings of the literature about the main types of errors in the drug chain, with emphasis on the omission of doses.[21–22,24]

Regarding the financial impact of the incidents studied, there was an additional cost to hospital treatment in only seven cases of accidents/falls and three episodes of medication error. It is emphasized that in the present study we opted for the variable direct costs approach, related to incidents that

included costs with materials/medications, radiological examinations and laboratory tests, specifically for cases of medication errors, according to data presented in Chart 1.

Regarding the costs related to accidents/falls, there was emphasis on the costs of radiological examinations, with an average of R$ 151.90 (R$ 15.30 to R$ 262.65). This data may portray the concern of the care team in identifying trauma-related injuries and, in few situations, therapeutic or reparative interventions were necessary. In order to identify the economic burden associated with approximately 500 cases of falls in the hospital environment, a study conducted in Australian hospitals found an average total cost of US$ 19,289.00.[25] However, the authors did not present the individual costs for each fall case nor did they stratify the groups of costs with medications, tests, procedures, among others.

When looking at patterns for comparations in the literature, we can see that studies that address falls as a cause of hospitalization in the elderly population are highlighted, but that did not investigate the direct costs of this type of event as an additional cost to hospital treatment, but as expenses with hospital treatment for external causes.[17,26]

Contrarily, they treat the costs of falls in the hospital environment indirectly, through the evaluation of the hospitalization length.[27]

Regarding the costs of medication errors, there was a noticeable variation in the values related to the management of the incidents included in the study (between R$ 31.16 and R$ 21,534.61), which resulted in an episode with severe harm, which resulted in the patient-victim being hospitalized in the ICU for a long period. A recent literature review on the costs of medication errors and Medication AE showed wide variability of values, with an average of US$ 617,493,770.36, ranging from US$ 83.32 to US$ 5,095,640,000.00.[10] The authors attribute the asymmetry of the values obtained by different costing methods presented in the researches to these variations, as well as the lack of clarity regarding the procedures for assigning costs.

Another systematic review study, with broader inclusion criteria, states that the true economic impact of medication errors has not yet been accurately estimated, also in view of the variability of the methods applied, and studies with more precise methods are needed, as well as the evaluation of specific cost groups.[28]

By analyzing accidents/falls and medication errors from the perspective of RCA, as described in Chart 2, it was possible to characterize the main contributing factors and their root causes according to the professionals involved in nursing care. In this process, the aspects related to the team, the professional and the execution of tasks in nursing care stood out. It is noteworthy that, when referring to the team, circumstances related to collective actions involving two or more professionals responsible for patient care (communication process, verbal/writing, leadership and technical supervision) should be considered. The aspects related to the professional refer to individual characteristics (knowledge, skills, attitudes and/or personal experiences).

For both categories of incidents analyzed, the root causes related to the team were identified, focused on the failures in the supervision of the nursing team by the nurse, failures in communication between different professional classes involved in care and excessive reliability on the medical professional guidance, which resulted in the absence of questions that could have prevented the occurrence of the error and its consequent harm.

Research conducted in the Netherlands showed that, of all root causes identified for incidents occurring in more than 20 hospital institutions, the majority (70.0%) was related to human/professional factors, followed by organizational/management causes (17.0%), techniques (7.0%) and the patient (6.0%).[29] Among the human/professional factors mentioned by the authors, we highlight those related to failures in planning, performing tasks and in the process of supervising procedures.

Also with the objective of applying RCA in cases of medication errors and falls, a study conducted nationwide obtained results similar to this, for cases of falls, because it found a predominance of aspects related to the patient, the team and the environment, as a cause for the type of incident.[30] However, when analyzing medication errors, the authors classified aspects related to management as more relevant causes to failures in the medication chain. This finding differs from the results of this research, for which factors or root causes related to service management were not directly detected.

As limitations of this study, we highlight the short study period with a consequent reduced sample of incidents with additional costs, which made it impossible to carry out tests of association between the variables additional costs and type of accident/fall and medication error. In addition, characterization data were not collected from the professionals who made up the RCA teams, making it impossible to reflect on the contributing factors and root causes pointed out according to the prevailing care practice.

CONCLUSION

It is concluded that accidents/falls and medication errors have a low incidence in the context studied and rarely cause moderate or severe harm to the patient. However, such incidents impact on the variable direct costs of the hospitalization process and are related to the type of harm caused to the patient.

Regarding the contributing factors and root causes of accidents/falls and medication errors, it was found that the aspects related to the health work process represent the main reasons for failure of this nature, with emphasis on circumstances involving teamwork, the skills of the professional involved in the error and the execution of nursing care.

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NOTES

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Discussion of the results: Paulino GME, Matsuda LM.
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CONFLICT OF INTEREST

There is no conflict of interest.

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