Medication related incidents in a chemotherapy outpatient unit

Incidentes relacionados a medicamentos em um ambulatório de quimioterapia

Jéssica Baldissera Carollo[1]
Rafaela Andolhe[1]
Tânia Solange Bosi de Souza Magnago[1]
Graziele de Lima Dalmolin[1]
Adriane Cristina Bernat Kolankiewicz [2]

Keywords
Patient safety; Medication errors; Drug therapy

Descritores
Segurança do paciente; Erros de medicação; Tratamento farmacológico

Submitted
July 28, 2017

Accepted
August 21, 2017

Abstract

Objective: To identify medication related incidents in outpatient chemotherapy unit of a teaching hospital.
Methods: This cross-sectional and descriptive study included medical records of patients who were assisted from June to August 2016 in an outpatient chemotherapy unit from a public hospital in South Brazil. Data were collected using an instrument divided into four sections: section A - questions related with characterization of patient, section B - questions related with medical prescription, section C - questions related with medication dispensing, and section D - questions related with medication administration.
Results: A total of 5,012 incidents occurred related with medical prescription, 21 associated with dispensing and 27 medication administration, therefore, totalizing 5061 incidents with and without harms to patients.
Conclusion: Of 5,061 incidents that occurred, the mean incident per health care procedures was 3.6. Incidents were really present in hospital/outpatient unit environment and they mean per health care procedures was relatively high. Our findings can provide information for health professionals about reality of institutions in terms of incidents that can occur in health practice.

Resumo

Objetivo: Identificar os incidentes relacionados a medicamentos em um ambulatório de quimioterapia de um hospital universitário.
Métodos: Estudo transversal, descritivo, com fichas de acompanhamento dos pacientes atendidos no ambulatório de quimioterapia de um hospital público do Sul do Brasil, no período de junho a agosto de 2016. Para a coleta dos dados, foi utilizado um instrumento de pesquisa dividido em quatro blocos: bloco A - questões relacionadas à caracterização do paciente; bloco B - questões relacionadas à prescrição médica; bloco C - questão relacionada à dispensação dos medicamentos; e o bloco D - questões relacionadas à administração de medicamentos.
Resultados: Ocorreram 5012 incidentes de prescrição médica, 21 de dispensação e 27 de administração de medicamentos, totalizando 5061 incidentes com e sem danos.
Conclusão: Observou-se que o número total de incidentes foi de 5061, sendo a média de incidentes por atendimento de 3,6. Esse resultado evidenciou que os incidentes, realmente, estavam presentes no ambiente ambulatorial/hospitalar e que sua média por atendimento foi relativamente elevada. Os achados do estudo poderão informar aos profissionais sobre a realidade da instituição frente aos incidentes que ocorrem na prática em saúde.

Corresponding author
Jéssica Baldissera Carollo
Av. Roraima, 1000,
97105-900, Santa Maria, RS, Brazil.
jessicabcarollo@gmail.com

DOI
http://dx.doi.org/10.1590/1982-0194201700063

[1]Universidade Federal de Santa Maria, Santa Maria, RS, Brazil.
[2]Universidade Regional do Noroeste do Estado do Rio Grande do Sul, Ijuí, RS, Brazil.
Conflicts to interest: the authors do not have conflicts of interest to report.

Introduction

Patient safety is an imperative aspect in health care since Hippocrates and Florence affirmations about the need of not causing harm to patients.[1] However, incidents during health care are common because factors related with health system or human performance (behavior, performance and communication). These factors are featured as a sum of fails in management process, work environment and professionals' errors.[2]

In 1999, the book To Err is Human: Building a Safer Health Care System published in the United States, reported an estimation that medication errors in hospitals cause from 44,000 to 98,000 deaths per year, but the majority of incidents are preventable.[3]

Among incidents in health care, those related to medications are the most common in Brazilian institutions and they are distinguished between adverse reactions and medication error, but this latter is avoidable.[4] Hospitals, on average, spends 15% to 20% of its expenses to reverse problems caused by the misuse of medications.[5]

Incidents are even more severe when antineoplastic drugs are involved or the so-called chemotherapy agents or potentially hazardous drugs.[6]

We performed a literature review to search data on medication related incidents in hospital environment in LILACS (Latin American and Caribbean Health Sciences Literature), PubMed and SciELO (Scientific Electronic Library Online). A total of 27 studies was retrieved. After reading and critical analysis of articles, only one study had evaluated errors in prescribing, dispensing and administering of the medications.[7]

The review was fundamental to make evident the lack of studies on medication related incidents during prescribing, dispensing and administering of medications in the hospital environment, therefore, this finding reinforce the importance of investigating the subject. Hospital services that use high-alert medications such as chemotherapy agents need more rigorous and standardized control during medication process.[8]

The guiding question of our study is: what are the medication related incidents in an outpatient chemotherapy unit? This study sought to identify medication related incidents in an outpatient chemotherapy unit at teaching hospital. In addition, we investigated biosocial and clinical characteristics of patients who received medications in the outpatient chemotherapy unit, frequency and types of incidents involving medications.

Methods

This was a cross-sectional and descriptive study. Data were collected from June to August 2016 using medical records of patients assisted in the outpatient chemotherapy unit of a teaching hospital in South Brazil.

The calculation of minimal sample to develop the study was based on 12,778 health care procedures done in 2015. In that year, the month mean of care delivered was 1,065 (SD=97.99). The estimated sample was 374 health care procedures from June to August 2016 based on population who received care in that year.

Data was collected using an instrument divided into four sections (A, B, C and D): the section A included questions related with characterization of patient (sex, date of birth, diagnosis, comorbidities, type of catheter, medical specialty, and number of medication prescribed). The section B had questions associated with medical prescription (correct identification of patient, identification of prescriber, name of the institution, date of prescription, legibility, use of abbreviations, prescription of medication with similar names, dosage, allergies, duration of the treatment, posology, dilution, time of infusion and route of administration). The section C had questions related with dispensation of medications (correct dispensation). And the section D had questions related with administration of medications (administration record, adverse reaction, incident and incident notification).

To complete the instrument we evaluated patients' medical records who received care and also technical complaints forms and incident notifications.

Data collected were organized in spreadsheets using the SPSS Statistics 17.0 for Windows 8 software. Initially, we calculated descriptive statistics (mean, median, standard deviation) for quantitative variables and absolute frequencies (n), and relative (%) for categorical variables.

This study was approved by the Ethical and Research Committee of institution under the number CAAE 55236816.9.0000.5346. The development of this study followed national and international ethical and legal aspects of research on human subjects.

Results

During the study we analyzed 1,403 medical records. Patients' mean age were 57.6 years (SD=15.2), and other demographic and clinical characteristics (Table 1).

The main reason of chemotherapy treatment was breast cancer with 31.2% (n=438), followed by prostate cancer 13.8% (n=193) and colorectal cancer with 10.3% (n=144). Of health care procedures, 732 (52.2%) did not have secondary diagnosis (presence of comorbidities).

A total of 21 medications were incorrectly dispensed, in 42.9% (n=9) the wrong medication was dispensed, followed by 28.6% (n=6) with error in chemotherapy drug dosage. Of the nine medications wrongly dispensed, four were promethazine, two potassium chloride concentrate 20%, one ephedrine and three atropine, all medications come in glass ampoules.

Of 1403 health care procedures, 18 (1.3%) had adverse reactions in terms of medication administration. The medication administration recorded by nursing team occurred in 99.4% (n=1,394) of health care procedures, and 0.6% (n=9) there was no record of prescription. A total of five (0.4%) incidents that caused harms in patients (Figure 1).

Mean of incidentes per health care procedures was 3.6. According to the table 2, the most prevalence incidents were: use of abbreviations in medical prescription (n=1350), lack of dilution of medication in the order (n=1336) and lack of duration

Table 1. Distribution of patients based on demographic variables and clinical aspects (n=1403)

Variables	Frequency n(%)
Sex	
Male	584(41.6)
Female	819(58.4)
Age (N=1402)	
18 to 52	449(32.0)
53 to 65	478(34.1)
66 to 92	475(33.9)
Type of catheter	
Totally implanted	111(7.90)
Peripheral catheter	1020(72.7)
No catheter	272(19.4)
Medical specialty	
Oncology	1260(89.8)
Pediatric Hematology	44(3.10)
Dermatology	20(1.40)
Rheumatology	67(4.80)
Nephrology	6(0.40)
Others	6(0.40)
Routes of administration	
Intravenous	680(48.5)
Oral	12(0.90)
Subcutaneous	147(10.5)
Intramuscular	16(1.10)
Intravesical	33(2.40)
Intravenous and Oral	436(31.1)
Subcutaneous and Oral	37(2.60)
Intramuscular and Oral	13(0.90)
Others	29(2.10)

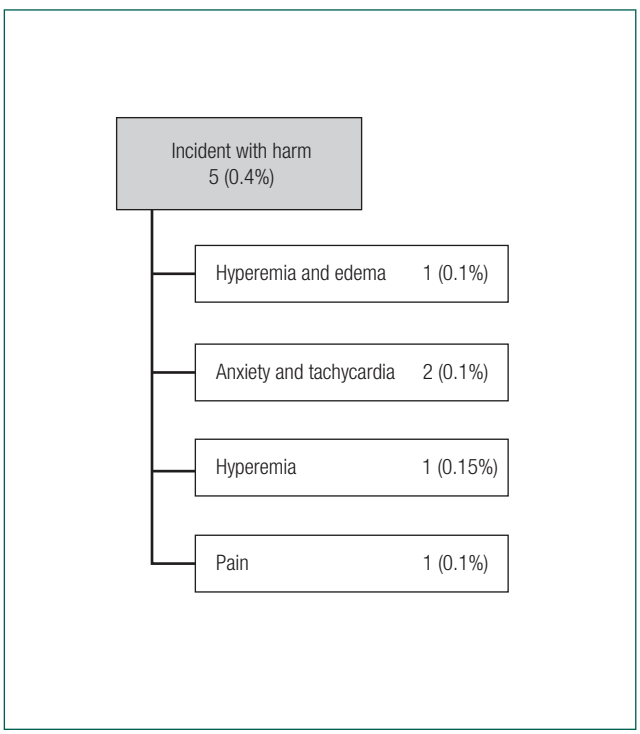

Figure 1. Distributions of incidents that caused harm to patients, patients' signs and symptoms (n=5)

Table 2. Incidents that occurred during prescription processes, dispensing and administration of medications (n=5061)

Incidents	Health care procedures n(%)
Prescription of incidents	
Abbreviations in medical prescription	1350(26.7)
Lack of dilution of medication in the prescription	1336(26.4)
Lack of duration of treatment	529(10.5)
Medication with similar names	480(9.50)
Incomplete identification of prescription	471(9.30)
Lack of posology in prescription	235(4.60)
Lack of dosage expression of prescribed medication	210(4.20)
Illegible handwriting of medical prescription	193(3.80)
Incomplete identification of patient	114(2.20)
Incorrect data prescription	61(1.20)
Lack of route of administration of the prescribed medication	21(0.40)
Lack of dosage of the prescribed medication	12(0.20)
Total	5.012(99.0)
Dispensing incidents	
Wrongly dispensed medication	9(0.17)
Dispensed chemotherapy with wrong dosage	6(0.11)
Uncertainty dispensation	2(0.04)
Chemotherapy lacking protective cover	1(0.02)
Chemotherapy without registration of total volume	2(0.04)
Forgetting to dispense chemotherapy	1(0.02)
Total	21(0.40)
Administration incidents	
Adverse reaction to administrated medication	18(0.40)
Lack of record of medication administration	9(0.20)
Total	27(0.60)

of treatment (n=529). Incidents related with medication dispensing, wrong dispesation of medication was the most common reason (n=9). The adverse reaction was the most common reason in administration of incidents (n=18).

Discussion

Our study had prevalence of women (58.4%), which is similar data reported in other studies.[9-12] This finding can be justified because men seek treatment when diseases are in more advanced stages, therefore, a fact that rise health costs and turn infections and health related incidents more susceptible to occur.[9,13]

Our finding related with patients' age corroborates with other studies that reported patients mean age of 55 years. [12,14] This mean age also show that more non-elderly patients are requiring chemotherapy treatments. We believe that cancer is becoming a chronic disease affecting several age ranges in similar manners.

Although this study was carried out in an oncology sector, few patients (7.9%) were using totally implanted catheter (TIC), which is less invasive and painful to users.[12,15]

We also observed that most of patients who participated in the study had cancer (89.9%), although patients from other clinical areas receive care in the unit. No comorbidities were seen in 52.2% of care delivered, and this information was similar to another study,[10] which also did not find comorbidities in 55.1% of participants. However, in other study,[11] rate of patients who did not have comorbidities was 2.7%. Patients' mean age (57.6%) observed in the study can be related with low number of comorbiditites, given the fact that most of health care procedures was delivered to non-elderly patients.

Our study also confirmed that breast cancer was the most prevalent type of cancer, with 31.2% of health care procedures, followed by prostate cancer (13.8%) and colorectal cancer (10.3%). These data are similar to statistics reported in other series.[16]

Most of mediations were infused intravenously (48.5%), followed by combination of intravenous route and oral (31.1%). For this reason, it is fundamental that nursing team perform continuous monitoring of venous access to detect possible infection signs, as well as prophylaxis during both peripheral and central venous puncture.

The majority of prescriptions that was done electronically (80%). Legibility was found in 86.2% of prescription, given that most of them were electronic. This data can contribute to reduce errors related with illegible medical handwriting and poor interpretation of dosages and misunderstanding of names of medications. This study showed that electronic prescription enables to improve understand of what is written, and avoid bias in interpretation because of illegible handwriting in the order.[17]

Incorrect identification of patients, prescriber and date of prescription occurred in 8.1%, 33.6% and 4.3%, respectively. Another study.[18] found errors in names of patients in 4.7% of handwriting prescription, mixed name and typing errors in pre-

scription. In 33.7%, there was difficult to identify prescriber, a similar finding in our report. Therefore, we observed that 33.9% of errors in medication administration were related to problems of patients' identification.[19]

A scarcity exist in relation to relevant of date in medical prescription, however, this information[8] higlights the need of date in medical prescriptions, because when date is not informed problems can occur in terms of time of medication use and/or administration of a medication that is no longer need for the current condition of the patient.

Incorrect use of abbreviations, dosage expression, and posology was seen in 3.8%, 15%, 0.9% and 16.7% of health care procedures, respectively. One study,[18] showed that lack of standardization and rotine use of abbreviations (33.3/prescription) are important fails that can lead to errors in medication process. Of note,[20] some names of medications should be never abreviated, such as: units, microgram, subcutaneous, and cubic centimeter because any mistake in such information can cause severe harms to patients.

In our study, 34.2% of health care procedures had medications with similar names. The confusion related with name of medications is constantly associated with errors, although there is no justification for each, because the name of medication needs to be read out loud three times before preparation to be administered.[21]

For this reason, 37.7% of prescription did not present duration of treatment specified by the prescriber. This item is fundamental, mainly, for patients who receive care at outpatient units services,[8] In evaluated prescriptions, the dilution and infusion time are not present in 97.1% and 95.2% of them, respectively. Other study, [22] also showed prescription with incomplete information of medications, which facilitated errors in dispensing and administering of medications.

The administration route was not correctly identified in 1.5% of prescriptions. In other study,[23] administration route discrepancies were also identified in 1.7% of orders.

In our investigation, we observed 21 (1.5%) dispensing errors in hospital pharmacy. We also detected nine (0.6%) uncorrected dispensed medication, six chemotherapy agents with wrong dosage, uncertainty in dispensing in two cases (0.1%), one (0.1%) chemotherapy drug without protective cover, one chemotherapy without record of total volume, and one (0.1%) forgetting to dispense the medication. These types of errors constitute a break of the main principles of patient safety concerning the correct release of hospital medications.

We identified uncorrected dispensed of promethazine (n=3), potassium chloride concentration 20% (n=2), ephedrine (n=1) and atropine (n=3). All these medications are considered potentially danger in hospital and/or outpatient unit, therefore, they present high risk for patient, mainly, if wrongly dispensed.[24]

This finding reinforces the nursing practice as important barrier in interception of medication errors, considered that no incorrectly dispensed medication were administrated in the care of patients. A study detected 21 (1.5%) incidents without harms,[9] such as lapsus, equivocate and/or forgetting to dispense medications. The nursing team is highlighted as the main barrier to avoid errors in the final medication therapy process.

We identified five (0.4%) incidents that caused harms to patients who were assisted in the outpatient unit. These are characterized by hyperemia and edema, anxiety and tachycardia, hyperemia and pain. All of these information were recorded just after medication administration. These finding corroborate with a study [25] that reported five incidents with harm identified in the administration phase related to medication in a sample of 1,437 records.

Our study identified that prescription process, dispensing and administering of medication for patients had mean incidence of 3.6. In hospital environment, risks and harms can be presented, within acceptable minimal rate, i.e., take into consideration to conditions and available resource available for health care.[26]

Although only five incidents with harm occurred, we identified 5,061 incidents that could affect the patient and cause adverse reaction. For this reason, we believe that total of identified incidents in medication processes are preventable. Therefore, strategies can be established to reduce harms,

during health care procedures, and reduce current mean of incidents.

An institution must have manuals and protocols to assure the safety practice in use of medication during the prescription phases, dispensing, and administering of medication. In addition, the diffuse of this subject in lectures and training sessions for health professionals and students are important actions to take into consideration.[27]

Education on the correct use of medications and measures that prevent harms to health must be included in the curricula of undergraduate courses. Health education should be also discussed with patients and their caregiver in order to include them in the support process to prevent errors and, consequently, harms.

Each day patient safety must be in forefront of health discussions. Culture of safety in hospital environment needs to be strengthen in order to enable health professional to learn from past errors and, therefore, promote more safety health care delivery.

Our study limitations were under-notification of information in patients' medication records, which possible hidden relevant results for the study. The high frequency of health health care procedures and small number of individuals to collect information did not enable the analysis of some medical records, which were filled early, and not included in the study.

Conclusion

This study identified incidents during sections of medication therapy process: prescription, dispensing, and administering the medications. We observed that total of incidents was 5,061, and the mean of incidents per health care procedures was 3.6. This result showed that incidents were really presented in outpatient unit/hospital environment and on average such incidents had high rates.

Our findings provide information to health professional concerning institutions reality on incidents occurring during health care. This study could contribute to nursing practice and can encourage this professional to learn with errors from the past and promote a safety and quality health care.

Collaborations

Carollo JB, Andolhe R, Magnago TSBS, Dalmolin GL and Kolankiewicz ACB contributed to the conception of the study, analysis and interpretation of data; critical review relevant to the intellectual content, drafting the manuscript and approval of the proofs.

References

1. Nightingale F. Notas sobre enfermagem: o que é e o que não é. São Paulo: Cortez; 1989.
2. Reason J. Human error: Cambridge University Press; 1990.
3. Donaldson MS, Corrigan JM, Kohn LT. To err is human: building a safer health system: National Academies Press; 2000.
4. Capucho HC. Near miss: almost error or potential adverse event? Rev Lat Am Enferm. 2011; 19(5):1272-3.
5. Organization Health Organization (WHO). The conceptual framework for the international classification for patient safety (ICPS). Geneva: WHO; 2009.
6. Instituto Nacional do Câncer (INCA). Quimioterapia. Rio de Janeiro: INCA; 1993.
7. Franklin BD, Panesar SS, Vincent C, Donaldson LJ. Identifying systems failures in the pathway to a catastrophic event: an analysis of national incident report data relating to vinca alkaloids. BMJ Qual Saf. 2014; 23(9):765-72.
8. Agência Nacional de Vigilância Sanitária (ANVISA). Protocolo de segurança na prescrição, uso e administração de medicamentos. Brasília (DF): ANVISA; 2013.
9. de Azevedo Filho FM, Pinho DL, Bezerra AL, Amaral RT, da Silva ME. Prevalência de incidentes relacionados à medicação em unidade de terapia intensiva. Acta Paul Enferm. 2015; 28(4):331-6.
10. Paranaguá TT, Bezerra AL, Santos AL, Silva AE. Prevalência e fatores associados aos incidentes relacionados à medicação em pacientes cirúrgicos. Rev Esc Enferm USP. 2014; 48(1): 41-7.
11. Roque KE, Melo EC. Tempo de internação e a ocorrência de eventos adversos a medicamentos: uma questão da enfermagem. Esc Anna Nery Rev Enferm. 2011; 15(3):595-601.
12. Oliveira EB, Reis MA, Avelar TM, Vieira SC. Cateteres venosos centrais totalmente implantáveis para quimioterapia: experiência com 793 pacientes. Rev Col Bras Cir. 2013; 40(3):186-90.
13. Breeding J, Welch S, Whittam S, Buscher H, Burrows F, Frost C, et al. Medication Error Minimization Scheme (MEMS) in an adult tertiary Intensive Care Unit (ICU) 2009–2011. Aust Crit Care. 2013; 26(2):58-75.
14. Machado SM, Okino Sawada N. Avaliação da qualidade de vida de pacientes oncológicos em tratamento quimioterápico adjuvante. Texto Contexto Enferm. 2008; 17(4):750-7.

15. Nishinari K, Malavolta LC, Saes GF, Langer M, Carvalho Sobrinho A, Zerati AE, et al. Cateteres venosos totalmente implantáveis para quimioterapia: experiência em 415 pacientes. Acta Oncol Bras. 2003; 23(2).

16. Instituto Nacional do Câncer (INCA). Estimativa 2016: Incidência de câncer no Brasil. Rio de Janeiro: INCA; 2015. 122p.

17. Shane R. Computerized physician order entry: challenges and opportunities. Am J Health Sys Pharm. 2002; 59(3):286-8.

18. Rosa MB, Perini E, Anacleto TA, Neiva HM, Bogutchi T. Erros na prescrição hospitalar de medicamentos potencialmente perigosos. Rev Saúde Pública. 2009; 43(3):490-8.

19. Miasso AI, Cassiani SH. Erros na administração de medicamentos: divulgação de conhecimentos e identificação do paciente como aspectos relevantes. Rev Esc Enferm USP. 2000; 34(1):16-25.

20. Koczmara C, Jelincic V, Dueck C. Dangerous abbreviations:" U" can make a difference! Dynamics. 2005; 16(3): 11-5.

21. Hoffman J, Proulx S. Erros de medicação causados por confusão de nomes de drogas confusão. Drug Safety. 2003; 26(7):445-52.

22. Pote S, Tiwari P, D'cruz S. Medication prescribing errors in a public teaching hospital in India: A prospective study. Pharm Pract (Granada). 2007; 5(1):17-20.

23. Lombardi NF, Mendes AE, Lucchetta RC, Reis WC, Fávero ML, Correr CJ. Análise das discrepâncias encontradas durante a conciliação medicamentosa na admissão de pacientes em unidades de cardiologia: um estudo descritivo. Rev Lat Am Enferm. 2016; 24:e2760.

24. Instituto para Práticas Seguras no Uso de Medicamentos (ISMP). Medicamentos potencialmente perigosos de usos hospitalar e ambulatorial - lista atualizada. Bol ISMP; 2015;4(3):1-8.

25. Silva AM. Erros de prescrição médica de pacientes hospitalizados. einstein (São Paulo). 2009; 7(3):290-4.

26. Vincent C. Segurança do paciente: orientações para evitar eventos adversos. São Caetano do Sul: Yendis; 2010.

27. Rede Brasileira de Enfermagem e Segurança do Paciente (REBRAENSP). Estratégias para a Segurança do Paciente: manual para profissionais da saúde/Rede Brasileira de Enfermagem e Segurança do Paciente. Porto Alegre: EDIPUCRS. 2013.