● **Original article**

MEDICATION ADMINISTRATION – NURSING WORKLOAD IN CLINICAL INPATIENT UNITS

Angélica Kreling[1], Ana Maria Müller de Magalhães[2]

ABSTRACT: Objectives: To verify the number and types of drugs prescribed and administered by nursing technicians in inpatient units and discuss its implications for nursing workload and patient safety. Method: exploratory cross-sectional study carried out in three inpatient units of a university hospital in southern Brazil from December 2014 to March 2015. The sample consisted of 162 work schedules of nurses that provided direct care to patients in the referred units. Data was collected with a tool designed for this purpose and analyzed with descriptive statistics. Results: the average number of doses prescribed per shift/technician was 60.45 (sd = 20.26) and administered was 34.50 (sd = 15.64). Sixteen different types of routes for administering the drugs were identified. Conclusion: The number and types of drugs prescribed and administered impact nursing workload and increase the risk of errors.
DESCRIPTORS: Medication systems in the hospital; Workload; Patient safety; Nursing.

ADMINISTRAÇÃO DE MEDICAMENTOS – CARGA DE TRABALHO DA EQUIPE DE ENFERMAGEM EM UNIDADE DE INTERNAÇÃO CLÍNICA

RESUMO: Objetivos: verificar a quantidade e tipo de medicamentos prescritos e administrados por técnicos de enfermagem em unidade de internação e discutir suas implicações na carga de trabalho da enfermagem e na segurança dos pacientes. Método: estudo transversal exploratório realizado em três unidades de internação clínica de um hospital universitário do sul do país, entre dezembro de 2014 e março de 2015. A amostra foi de 162 escalas de trabalho de pacientes atribuídos aos profissionais de enfermagem. Os dados foram coletados com instrumento específico e analisados por meio de estatística descritiva. Resultados: o número médio de doses prescritas por turno/técnico foi de 60,45 (dp = 20,26) e administradas foi de 34,50 (dp = 15,64). Identificou-se 16 diferentes tipos de vias para administração dos fármacos. Conclusão: o número e tipo de medicamentos prescritos e administrados geram implicações na carga de trabalho da equipe e contribuem para risco de erros.
DESCRITORES: Sistemas de medicação no hospital; Carga de trabalho; Segurança do paciente; Enfermagem.

ADMINISTRACIÓN DE MEDICAMENTOS – CARGA DE TRABAJO DEL EQUIPO DE ENFERMERÍA EN UNIDAD DE INTERNACIÓN CLÍNICA

RESUMEN: Objetivos: verificar la cantidad y tipo de medicamentos prescriptos y administrados por auxiliares de enfermería en unidad de internación, y discutir sus implicaciones en la carga de trabajo de enfermería y en la seguridad de los pacientes. Método: Estudio transversal exploratorio, realizado en tres unidades de internación clínica de hospital universitario del sur de Brasil, entre diciembre de 2014 y marzo de 2015. Muestra de 162 escalas de trabajo de pacientes atribuidas a profesionales de enfermería. Datos recolectados con instrumento específico, analizados por estadística descriptiva. Resultados: El número promedio de dosis prescriptas por turno/auxiliar fue de 60,41 (SD=20,26), y el de administradas, 34,50 (SD=15,64). Fueron identificadas 16 tipos de vías de administración para los fármacos. Conclusión: El número y tipo de medicamentos prescriptos y administrados genera implicancias en la carga de trabajo del equipo e incrementan el riesgo de errores.
DESCRIPTORES: Sistemas de Medicación en Hospital; Carga de Trabajo; Seguridad del Paciente; Enfermería.

[1]Nurse. Master Student of Nursing. Universidade Federal do Rio Grande do Sul. Porto Alegre, RS, Brazil.
[2]Nurse. PhD in Nursing. Professor of Nursing at Universidade Federal do Rio Grande do Sul. Porto Alegre, RS, Brazil.

Corresponding author:
Angélica Kreling
Universidade Federal do Rio Grande do Sul
R. Demétrio Ribeiro, 1030 - 90010-313 - Porto Alegre, RS, Brasil
E-mail: angelicakreling@gmail.com

● INTRODUCTION

Nursing practices are constantly associated by the media to events related to medication administration in hospitals and other health services. Although medication administration involves a multidisciplinary process, the nursing team has a great deal of responsibility in the management of pharmacotherapy and in ensuring patient safety, because of their key role in patient care[1-4].

Medication administration is intrinsically related to the nursing workload, as it is a high-frequency activity performed by these health professionals[5], and overload contributes to the occurrence of errors in medication administration[1,6-7]. Also, drug management and administration has become an increasingly complex activity in the organization of patient care. Patients in very severe conditions, shorter lengths of stay and the large number of drugs prescribed also contribute to the delivery of more complex care by the nursing team[3].

It is estimated that 40% of the time spent by the nursing staff in clinical inpatient units is devoted to medication administration[7]. The increased demands faced by nurses regarding drug administration was also highlighted in a recent Brazilian study[5] that showed that health professionals recognize that drug administration is one of the main factors related to the excessive workload and that may pose risks to patient safety. The results showed an association of workload with increase in the nurse-to-patient ratio, which may lead to a larger number of drugs to be administered per shift to each patient.

Despite initiatives to ensure safe medication administration in the nursing work process, such as the use of a system to check medication administration called the "rights" of medication administration - right patient, right drug, right route, as well as right time, right dose, right form and right response[8-9], failures and errors in the medication process are among the most frequent adverse events in health institutions[10-11].

These failures and errors in the medication process may result from active failures, such as lack of attention during medication prescription/medication prescription adherence, and latent conditions[12], such as workload and understaffing. The nursing team must ensure patient safety, since these professionals are responsible for the preparation and administration of drugs to the patients, being ultimately responsible to prevent and reduce medication errors[13].

The concept of workload adopted in this study is based on several studies that attempted to investigate the association between the workload of the nursing team and patient safety issues, by examining the nurse-to-patient ratio, as well as workplace conditions[5,14-16].

In view of these considerations, the present study may contribute to a deeper understanding of a crucial issue in the daily routine of nursing professionals, expressed in the following question: what is the number and type of medications administered by nursing professionals during their work shift?

Therefore, the present study aims to verify the number and type of drugs prescribed and administered by each nursing worker in a clinical inpatient unit and to discuss their implications for nursing workload and the safety of hospitalized patients.

● METHOD

Exploratory cross-sectional study carried out in three clinical inpatient units of a university hospital in southern Brazil. The population consisted of nursing professionals who performed their duties in the referred clinical inpatient units and the patients admitted to them. Systematic random sampling was used for selecting the work schedules of the nurses during each work shift.

The sample consisted of 162 work schedules of nursing technicians (NT) in three clinical inpatient units, as follows: 18 work schedules per shift, considering a 95% confidence level, a margin of error of 3 and mean (standard deviation) of 35 (10) drugs administered per nursing technician at each work schedule during their work shift, with 10% added to the final sample size to compensate for possible losses, according to a pilot study.

Nursing technicians whose work schedules involved the administration of medications to patients admitted to the unit were included in the study. The work schedules of the nursing technicians responsible for administering medications to patients who were outside the unit for undergoing surgical or diagnostic procedures during data collection were excluded from the sample.

Data collection was performed from December 2014 to March 2015 with the use of a tool specifically designed for this purpose and through consultation of the medical records of hospitalized patients included in the work schedules of nursing technicians selected by systematic random sampling. The work schedules included patient identification data (medical record), number and type of drugs prescribed, number and type of medicines administered and number of patients in the work schedule of each professional. Data related to patient characterization was included in the study - average length of stay, gender, age group, medical specialties and medical diagnoses - were collected through consultation of the institutional database IG-BSC.

Data was analyzed by descriptive statistics, with continuous variables described by mean and standard deviation, and categorical variables described by absolute and relative frequencies. Analysis of variance (ANOVA) was used for inferential analysis of the differences in the means of medications prescribed and administered per work shift followed by Bonferroni multiple comparison tests, with a significance level set at 5%. The Statistical Package for Social Science (SPSS), version 18.0, was used in the analysis.

The project observed all applicable ethical principles and was approved by the Research Ethics Committee for medical research involving human subjects, under no 926.626/2014. The research team signed a term of commitment to use data (TCUD) before searching the patients' records.

● **RESULTS**

Based on data collected with the IG-BSC, a tool used to characterize the profiles of patients admitted to the units surveyed in the study period (Table 1), it was found that 1,148 patients were admitted to the three clinical inpatient units, and the average stay of this group of patients was 8.58 days. The sample was characterized by 581 (50.61%) male patients and a predominance of individuals aged 60 years or over 561 (48.87%). The two main groups of medical diagnoses were those related to diseases of the circulatory system 325 (22.20%) and neoplasms 316 (21.58%).

Table 1 – Characterization of the patients admitted to the units investigated in this study. Porto Alegre, RS, Brazil, 2015 (continues)

Variable	n (N = 1148)	%
Gender		
Male	581	50.61
Female	567	49.39
Age group		
13 to 29 years	96	8.36
30 to 59 years	491	42.77
60 years or above	561	48.87
Medical specialty		
General Medicine	473	41.20
Neurology	104	9.06
Oncology	102	8.89
Others	469	40.85
Patients discharged per ICD†		
Chapter IX - Diseases of the circulatory system	325	22.20

Chapter II - Neoplasms [tumors]	316	21.58
Chapter XI – Diseases of the digestive system	135	9.22
Chapter X - Diseases of the respiratory tract	130	8.88
Chapter I - Some infectious and parasitic diseases	109	7.45
Chapter XVIII - Symptoms, signs and abnormal findings of clinical and laboratory exams not elsewhere classified	90	6.15
Others	359	24.52

†total number of patients discharged per ICD greater than the total number of medical specialties because the patient has more than one diagnosis.

Based on the analysis of data from 162 work schedules of nursing technicians, the number and type of drugs prescribed and administered per nursing technician and per work shift were obtained, as described in Table 2.

Table 2 – Number of drugs prescribed and administered per work shift, per nursing technician and per patient in the clinical inpatient units. Porto Alegre, RS, Brazil, 2015

Variable	Mean	sd‡	p§
Medications prescribed per technician††			<0.001
Morning	60.94	16.61	
Afternoon	44.48	13.27	
Night	75.96	17.06	
General	60.45	20.26	
Medications administered per technician††			<0.001
Morning	35.43	11.17	
Afternoon	20.20	7.76	
Night	47.87	12.85	
General	34.50	15.64	
Medications prescribed per patient‡‡			<0.001
Morning	10.18	2.33	
Afternoon	7.44	1.91	
Night	10.18	2.06	
General	9.26	2.46	
Medications administered per patient‡‡			<0.001
Morning	5.92	1.70	
Afternoon	3.37	1.13	
Night	6.41	1.58	
General	5.23	2	

‡Standard deviation; §ANOVA's p-value followed by multiple comparisons with Bonferroni correction; ††Significant difference between the three work shifts ($p<0.05$); ‡‡Significant difference between the afternoon shift and the other shifts ($p<0.05$).

It was found that most medications are prescribed and administered in the night shift by nursing technicians. It is important highlight that this is a long 12-hour shift. Moreover, inferential analysis with Bonferroni test showed a significant difference between the work shifts.

Sixteen (16) different routes for administration of drugs are used depending on the type of medication prescribed and administered. The most frequent route for administration of drugs in the three work

shifts was the oral route, followed by intravenous route. IV route is predominantly prescribed for administration "as needed" (PRN), in cases of analgesia, gastrointestinal disorders and hyperthermia, as well as antibiotic therapy (Table 3).

Table 3 – Types of drugs prescribed and administered per work shift in clinical inpatient units. Porto Alegre, RS, Brazil, 2015

Type of route	Morning		Afternoon		Night	
	Mean	sd	Mean	sd	Mean	sd
Oral route						
Prescribed	19.19	7.71	10.28	5.33	21.59	7.95
Prescribed PRN	6.11	2.95	5.85	2.45	7.46	3.62
Administered	17.44	6.70	9.70	5.20	20.80	7.35
Intravenous route						
Prescribed	5.51	2.84	4.87	2.64	9.19	5.25
Prescribed PRN	12.37	4.08	12.76	4.58	15.11	3.99
Administered	6.06	3.10	5.32	2.67	10.58	5.76
Subcutaneous route						
Prescribed	5.53	1.97	2.34	1.14	5.76	1.90
Prescribed PRN	2.04	1.11	2.09	1.24	2.40	1.43
Administered	5.70	2.07	2.32	1.28	5.85	1.98
Intramuscular route						
Prescribed	1	---	1.14	0.38	---	---
Prescribed PRN	1.56	0.73	1.30	0.48	1.25	0.46
Administered	---	---	1	---	1	---
Via probe						
Prescribed	5.06	3.76	3.17	2.25	6.49	3.47
Prescribed PRN	1.5	0.69	1.30	0.57	2.12	1.77
Administered	4.79	3.46	3.15	2.18	6.60	3.42
Topical route						
Prescribed	2.09	1.52	1.54	0.95	2.10	1.47
Prescribed PRN	1	---	1	---	1	---
Administered	1.85	1.18	1.61	0.84	1.79	1.21
Inhalation						
Prescribed	3.23	2.44	1.55	0.77	4.49	3.73
Prescribed PRN	1.38	0.52	1.20	0.45	1.75	0.96
Administered	3.25	2.30	1.52	0.74	4.31	3.68
Serum/Solutions						
Prescribed	1.90	0.97	1.90	1.08	2.19	1.31
Prescribed PRN	1.64	1.33	1.81	1.15	1.88	1.17
Administered	1.43	0.70	1.28	0.54	1.97	0.10
Others§§						
Prescribed	1.64	0.81	2	0.63	3.73	2.49
Prescribed PRN	1.28	0.46	1.48	0.67	1.39	0.50
Administered	1.67	0.71	1.33	0.52	3.33	2.47

†††VO = ocular route, VR = rectal route, SL = sublingual route, GU = genitourinary route, VA = auricular route, VN = nasal route, ID = intradermal route and PD = peridural administration.

Drugs administered by inhalation, topically and via probe have the higher percentages of administration compared to prescribed medications (Table 4), since few drugs prescribed as needed are administered by these routes.

Table 4 – Average percentage of medications administered compared to prescribed. Porto Alegre, RS, Brazil, 2015

Type of route	Morning		Afternoon		Night	
	Mean	sd	Mean	sd	Mean	sd
Oral route	67.97	13.62	57.99	15.78	73.04	13.42
Intravenous route	32.58	11.72	30.22	12.81	41.82	15.40
Subcutaneous route	79.29	14.98	58.39	22.60	75.20	15.71
Intramuscular route	---	---	76.19	30.21	100	---
Via probe	79.97	18.27	82.05	17.68	86.27	13.21
Topical route	89.80	18.18	94.78	14.73	87	22
Inhalation	90.79	16.09	91.95	18.16	93.34	13.53
Serum/Solutions	52.42	29.13	43.96	19.33	57.68	22.66
Others†††	78.89	25.22	72.22	31.03	74.22	22.76

††† VO = ocular route, VR = rectal route, VSL = sublingual route, GU = genitourinary route, VA = auricular route, VN = nasal route, ID = intradermal route and PD = peridural administration.

Based on the work schedules, the mean number of patients per technician/work shift was obtained, with a mean of 5.98 (sd = 0.90) patients/technician in the morning shift, 5.98 (sd = 0.83) in the afternoon shift and 7.44 (sd = 0.60) on the night shift.

● DISCUSSION

Analysis of the profile of hospitalized patients showed a predominance of elderly individuals, aged 60 years or older, and most medical diagnoses were related to diseases of the circulatory system and neoplasms. The findings of a Brazilian study, which characterized the profile of hospital admissions of elderly individuals, reported circulatory and respiratory diseases as well as neoplasms as the main causes of hospitalization[17].

A North-American study aimed to determine the predictive factors of medication errors and describing the type and number of these errors experienced by hospitalized elderly patients found results similar to those of the present study. In the referred study, most patients were hospitalized to treat disorders of the circulatory system 2,903 (28.5%) and cancers 1,406 (13.8%). The authors also mentioned that the type of drugs and the total number of medications administered during hospitalization (polypharmacy) were factors predictive of failures in the medication process[18].

The mean number of drugs prescribed during the work schedules of the nursing technicians was 60.45 (sd = 20.26), and 9.26 (sd = 2.46) was the mean number of doses prescribed per patient. An observational study showed similar results, with a mean number of 9.7 drugs prescribed per patient, and a range of 0 to 20 drugs[19]. However, findings from other studies contrast with our data, demonstrating a wide variation in the number of doses prescribed per patient in different contexts[11,20].

These differences in the findings of local and international studies regarding the number of drugs prescribed per patient indicate the need for further studies to describe the magnitude of this phenomenon in the Brazilian scenario and reinforce the importance of the present investigation.

The heavy workload of health professionals who must carefully read and interpret drug information

on labels to ensure that they are appropriately and safely prepared and administered to the patients, in addition to performing other activities in their work shifts, may interfere in the dynamics and safe process of medication prescription and administration, contributing to the occurrence of errors.

Regarding the drugs administered by nursing technicians during their work shifts, the mean number was 34.50 (sd = 15.64), and 5.23 (sd = 2.00) was the mean number of doses administered per patient. These findings demonstrate that each nursing professional was responsible for preparing and administering a large number of medications during his/her work shift, which deserves special attention and further investigation to ensure the safety of care processes. In a study on drug-related adverse events that used naïve observation, 27.30% of the patients observed were given one dose of medication; 17.20%, two doses; 11.60%, three doses; 10.60%, four doses and 33.30%, five doses or more, with a maximum of 31 doses [21].

It is known that the number of doses of drugs administered to patients and the nurse-to-patient ratio are important components in the assessment of the demands faced by the healthcare team to meet the patients' needs. Medication errors were significantly associated with the increase in the number of patients attributed to nurses[20,22] and it has been demonstrated that most of these errors occur in clinical inpatient units[23]. The characteristics of the users of these units, who are physically vulnerable patients who take many different drugs, and the heavy workload of the nursing team, were highlighted as possible causes of these failures[23].

Regarding the route of administration, most drugs prescribed were oral drugs, followed by intravenous drugs and medications administered through catheters. This is consistent with observational studies that found that parenteral, oral and enteral routes of administration were the most frequent[19-20].

The causal factors of medication errors include the number of drugs administered (both drugs prescribed and prescribed PRN) and the several drug dosages and forms of presentation, especially when the drugs are concomitantly administered[11,19]. Also, according to the National Patient Safety Policy (PNSP), the prescription of medications "as needed" should be accompanied by information on dose, dosage and conditions of use in order to prevent possible interactions and pharmacological incompatibilities[8].

Current studies showed that errors occur at a rate of 1 error for every four drugs administered[19] and that there is a 3.32-fold higher risk of occurrence of error when three or more medications are prescribed per day. The referred studies also showed a relationship between the duration of patient stay (4 days or more) and the occurrence of errors[11].

Based on data from other studies and on the findings of the present study, it can be affirmed that the knowledge of the number of medications prescribed and administered per patient and number of patients on the work schedules of nursing professionals are key to the assessment of nursing workload and to the elaboration of strategies to improve the organization of care processes. Identifying the periods that concentrate most medication prescription and administration activities in the hospitals, as well as the types and routes of medication administration, can be useful in planning of the distribution of the nursing team and reducing the risks of medication errors.

The number of medications administered differed significantly between work shifts, indicating the need to investigate whether the nursing staff is able to meet this patient care demand. The large number of medications and the high nurse-to-patient ratio identified in the night shift suggest the need to take a closer look at personnel planning and the organization of care processes.

As one limitation of this study concerns the small size of the sample, since the survey was conducted only in clinical inpatient units and in only one health institution. Thus, generalization of findings is not possible. The work demands associated with patient's pharmacotherapy care in other settings, such as surgical inpatient units and intensive care units, may differ and produce different results.

● **CONCLUSION**

The present study found that the nursing professionals were expected to prepare and administer a large number and a great variety of types of medications at each work shift 34.50 (sd = 15.64), with the highest concentration occurring in the evening and morning shifts, respectively.

The number, times, types and routes of drug administration, as well as the number of patients assisted by nursing professionals at different work shifts, are important factors to be considered in the assessment of nursing workload, which may compromise patient safety, as they increase the risk of occurrence of medication errors.

● REFERENCES

1. Praxedes MFS, Telles Filho PCP. Erros e ações praticadas pela instituição hospitalar no preparo e administração de medicamentos. Reme, Rev. Min. Enferm. [Internet] 2011;15(3) [acesso em 18 fev 2017]. Disponível: http://www.reme.org.br/artigo/detalhes/52.

2. Franco JN, Ribeiro G, D'Innocenzo M, Barros BPA. Percepção da equipe de enfermagem sobre fatores causais de erros na administração de medicamentos. Rev. bras. enferm. [Internet] 2010;63(6) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.1590/S0034-71672010000600009.

3. Bourbonnais FF, Caswell W. Teaching successful medication administration today: more than just knowing your 'rights'. Nurse Educ Pract. [Internet] 2014;14(4) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.1016/j.nepr.2014.03.003.

4. Adhikari R, Tocher J, Smith P, Corcoran J, Mac Arthur J. A multi-disciplinary approach to medication safety and the implication for nursing education and practice. Nurse Educ Today. [Internet] 2014;34(2) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.1016/j.nedt.2013.10.008.

5. de Magalhães AMM, Dall'Agnol CM, Marck PB. Carga de trabalho da equipe de enfermagem e segurança do paciente - estudo com método misto na abordagem ecológica restaurativa. Rev. Latino-Am. Enfermagem. [Internet] 2013;21(n.esp) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.1590/S0104-11692013000700019.

6. Volpe CRG, Pinho DLM, Stival MM, Karnikowski MGO. Medication errors in a public hospital in Brazil. Br J Nurs. [Internet] 2014;23(11) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.12968/bjon.2014.23.11.552.

7. Armitage G, Knapman H. Adverse events in drug administration: a literature review. J Nurs Manag. [Internet] 2003;11(2) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.1046/j.1365-2834.2003.00359.x.

8. Ministério da Saúde (BR). Anexo 03: protocolo de segurança na prescrição, uso e administração de medicamentos. [Internet] 2013 [acesso em 18 fev 2017]. Disponível: http://www20.anvisa.gov.br/segurancadopaciente/index.php/publicacoes/item/seguranca-na-prescricao-uso-e-administracao-de-medicamentos.

9. Elliott M, Liu Y. The nine rights of medications administration: an overview. Br J Nurs. [Internet] 2010;19(5) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.12968/bjon.2010.19.5.47064.

10. D'Amour D, Dubois CA, Tchouaket E, Clarke S, Blais R. The occurrence of adverse events potentially attributable to nursing care in medical units: cross sectional record review. Int J Nurs Stud. [Internet] 2014;51(6) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.1016/j.ijnurstu.2013.10.017.

11. Paranaguá TTB, Bezerra ALQ, dos Santos ALM, Silva AEBC. Prevalência e fatores associados aos incidentes relacionados à medicação em pacientes cirúrgicos. Rev. esc. enferm. USP. [Internet] 2014;48(1) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.1590/S0080-623420140000100005.

12. Reason J. Human error: models and management. BMJ. [Internet] 2000;(320) [acesso em 18 fev 2017]. Disponível: https://doi.org/10.1136/bmj.320.7237.768.

13. Ferreira RA, Pangaio AMWS, Bernardes RR, de Lima SS. Segurança do paciente e os eventos adversos: erro profissional ou do sistema? Rede Cuid. Saúde. [Internet] 2014;8(3) [acesso em 18 fev 2017]. Disponível: http://publicacoes.unigranrio.br/index.php/rcs/article/view/2033.

14. Aiken LH, Sermeus W, Van den Heede K, Sloane DM, Busse R, McKee M, et al. Patient safety, satisfaction, and quality of hospital care: cross sectional surveys of nurses and patient in 12 countries in Europe and the United

States. BMJ. [Internet] 2012;(344) [acesso em 18 fev 2017]. Disponível: https://doi.org/10.1136/bmj.e1717.

15. Dubois CA, D'Amour D, Tchouaket E, Clarke S, Rivard M, Blais R. Associations of patient safety outcomes with models of nursing care organization at unit level in hospitals. Int J Qual Health Care. [Internet] 2013;25(2) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.1093/intqhc/mzt019.

16. Nogueira LS, Koike KM, Sardinha DS, Padilha KG, de Sousa RMC. Nursing workload in public and private intensive care units. Rev. bras. ter. intensiva. [Internet] 2013;25(3) [acesso em 18 fev 2017]. Disponível: http://dx.doi.org/10.5935/0103-507X.20130039.

17. de Castro VC, Borghi AC, Mariano PP, Fernandes CAM, Mathias TAF, Carreira L. Perfil de internações hospitalares de idosos no âmbito do sistema único de saúde. Rev. Rene. [Internet] 2013;14(4) [acesso em 28 set 2017]. Disponível: http://www.revistarene.ufc.br/revista/index.php/revista/article/viewFile/1269/pdf.

18. Picone DM, Titler MG, Dochterman J, Shever L, Kim T, Abramowitz P, et al. Predictors of medication errors among elderly hospitalized patients. Am J Med Qual. [Internet] 2008;23(2) [acesso em 27 set 2017]. Disponível: http://dx.doi.org/10.1177/1062860607313143.

19. Härkänen M, Ahonen J, Kervinen M, Turunen H, Vehviläinen-Julkunen K. The factors associated with medication errors in adult medical and surgical inpatients: a direct observation approach with medication record reviews. Scand J Caring Sci. [Internet] 2015;29(2) [acesso em 23 fev 2017]. Disponível: http://dx.doi.org/10.1111/scs.12163.

20. Jennings BM, Sandelowski M, Mark B. The nurse's medication day. Qual Health Res. [Internet] 2011;21(10) [acesso em 23 fev 2017]. Disponível: http://dx.doi.org/10.1177/1049732311411927.

21. Donaldson N, Aydin C, Fridman M, Foley M. Improving medication administration safety: using naïve observation to assess practice and guide improvements in process and outcomes. J Healthc Qual. [Internet] 2014;36(6) [acesso em 23 fev 2017]. Disponível: http://dx.doi.org/10.1111/jhq.12090.

22. Berdot S, Sabatier B, Gillaizeau F, Caruba T, Prognon P, Durieux P. Evaluation of drug administration errors in a teaching hospital. BMC Health Serv Res. [Internet] 2012;12(60) [acesso em 27 set 2017]. Disponível: https://doi.org/10.1186/1472-6963-12-60.

23. Forte ECN, Machado FL, de Pires DEP. A relação da enfermagem com os erros de medicação: uma revisão integrativa. Cogitare Enferm. [Internet] 2016;21(5) [acesso em 27 set 2017]. Disponível: http://dx.doi.org/10.5380/ce.v21i5.43324.