

Research Article

Frequency of Medication Errors at the University Hospital Center Of Point-G, Mali

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Abstract:

Background: Medical errors are considered as a major threat to patient safety. The objective of our study was to describe essential steps in drug circuitry from prescription to administration at the University Hospital Center of Point-G.

Methods: We conducted a prospective cross-sectional study design at the University hospital center of Point G from January 30, 2021 to June 30, 2021. We collected data using a Case Report Form (CRF) and reviewed medication order sheets, medication administration records, and patient charts. To identify the independent predictors of medication errors, we analyzed the collected data using Stata version 12.

Results: The study included 41 patients with 96 prescriptions with 35 medication errors. The highest error rate was detected in prescription step (15.6%) followed by administration drug step (12.5%) and drug dispensation step (8.3%). The most frequent type of errors was the prescription of wrong drug combination (65.85%) followed by wrong indication (36.58%), wrong treatment duration (12.2%), wrong medication dispensing (15.5%), drug erroneously omitted during dispensation (4.4%), wrong drug delivery during dispensation (64%), wrong route for drug administration (20%) and wrong frequency of administration (12%). These errors did not compromise the health of the patients.

Conclusion: Medication errors were common at the University Hospital of Point G involving mainly errors in drug prescription, administration and dispensation.

Keywords: Administration, dispensation, error, médication, prescription.

I. Introduction

The drug circuitry in the hospital is a main pillar of the hospital care chain which ensures safety, quality and efficiency of care. This circuit is complex since it includes a clinical component, a logistical component, and involves all the actors in the patient care chain.

A medication error (ME) is any preventable event that has the potential to lead to either an inappropriate medication use or a patient harm. It occurs during drug prescription, transcription, dispensation, administration, adherence or monitoring [1, 2]. The medication use process that comprises prescription, preparation and administration of medications. It is reliant on a variety of processes anticipated to confirm that patients receive the appropriate treatment. Patients' safety will be compromised if there is a problem in any phase of either the medication process or an organizational system, which increases the likelihood that a patient will not receive the correct medication [3]. Medical errors are known as inevitable

events in the health care system [4, 5].

Medical errors increase the cost of hospitalization and medical expenses in both developed and developing countries which lead to decrease the quality of healthcare services [4, 5]. According to different studies, the prevalence of medication errors ranged from 1 to 40% [6-8].

A high prevalence of medical errors in older adults results from the accumulation of factors that contribute to medication errors in all age groups; such as polypharmacy, polymorbidity, enrolment in several disease-management programs, and fragmentation of care (the lack of collaboration between health-care providers and/or health-care organizations), and specific geriatric aspects including age-related pharmacological changes, lack of specific evidence on the efficacy and safety of medications, underuse of comprehensive assessment, less availability of drug formulations, and inadequate harmonization of recommendations among geriatrics across the world [9].

Thus, the security of the drug appears as an important quality issue, particularly within the health services to ensure the safety of the patient and the effectiveness of the treatment. In Mali, there are limited studies done on medication errors. This study focused to determine the frequency, nature and severity of medication errors at the University hospital center of Point-G.

II. Methods

We conducted a prospective cross-sectional study at the University hospital center of Point-G from Avril 30 to September 30, 2020.



Figure 1: University hospital center of Point-G

We included newly admitted patients into the hospital in the different departments (internal medicine department, neurology, pneumology and cardiology department) during the survey period. We recorded daily drug prescription, dispensation and administration to patients using a Case Report Form (CRF). The size of our sample was constituted on the basis of the total number of cases according to our inclusion and non-inclusion criteria. Services were selected based on their relatively high attendance rate.

The sample was made up of all the records including drug prescription, dispensation and administration. We visited departments daily to monitor data for control quality. These data concerned the type of drug, the dose, the duration of the treatment, the dosage form of medication, to identify a possible medication error in drug prescription, dispensation and/or administration.

We also collected information on diagnosis, medication history, treatment and the socio-demographic characteristics (age and sex of the patient)

We defined the following error types:

- **Prescription errors**

*An error of indication when a prescribed drug was either unnecessary or useless to the patient taking into account his/her symptoms and diagnosis.

*A dosage error when the drug was overdose or under dose, according to a correct assessment based on weight or age.

* A prescription error related to the duration of treatment for certain pathologies such as malaria whose treatment protocol was subject of the national malaria control program in Mali.

- **Dispensing errors**

Dispensing errors concern any error made by the pharmaceutical team during the analysis of the prescription, the communication of information, the galenic preparation and the delivery of drug to the care units or directly to patients.

- **Administration errors**

It's a medication error occurring in the administration of medication to a patient in terms of volume, infusion rate, dose calculation and drug reconstitution.

Data processing and analysis

The information obtained from individual patients' checklists was transferred to Excel. The collected data were analyzed using Stata version 12. Descriptive statistics were used to analyze frequency and percentage of medication errors among different variables.

III. Results

A total of 96 prescription with 347 lines of prescription medication and 3.6 lines of prescription were recorded. Medication error had been reported in 36.5% of patients.

Antihypertensive (12.96%), electrolytes and fluids (12.4%), Antibiotics (11%) and Anticoagulants (10.4%) have been the therapeutic class of drugs involved in the occurrence of medication errors. Among the types of errors recorded during prescription we found incorrect drug combination (65.8%), incorrect indication (36.6%), incorrect dosing (29.3%) and incorrect treatment duration (12.2%). the most common error types at the dispensing stage were medication errors with 15.5% and drug erroneously omitted with 4.4%. Administration error were observed and the majority were drug delivery rate error (64%), incorrect route (20%) and incorrect frequency of administration with 12%. Medication errors were in 82.9% cases of potential and in 17.1% of proven error

Table 1: Participant characteristics.

Variables	Category	Frequency (n=41)	Percent
Gender	Female	17	41
	Male	24	59
Age range (years old)	15-45	13	31.7
	46-75	24	58.5
	>75	4	9.8

Table 2: Prevalence of medication errors

Characteristics and medication errors prevalence	Frequency (%)
Number of prescription	96
Number of prescription with EM	35 (36.5%)
Number of prescription lines	347
Number of pharmaceutical intervention	10 (10.4 %)
Average lines per prescription	3.61

Table 3: Therapeutic class of drugs involved in the occurrence of medication errors.

Therapeutic class of drugs	Frequency	Percent
Antihypertensives	45	12.96
Electrolytes and fluids	43	12.39
Antibiotics	38	10.95
Anticoagulants	36	10.37
Analgesics	28	8.06
anti-ulcer	27	7.77
Anti-inflammatories	26	7.49
Diuréticos	26	7.49
Antimicrobials	19	5.47
Vitamins	14	4.03
Antitussives	12	3.45
Minerales	6	1.72
Neuroleptics	4	1.14
Anti-tuberculosis drugs	3	0.86
Others	20	5.73
Total	347	100

Table 4: Type of medication errors

Type of medication errors	Frequency (n=96)	Percent
Prescription errors N= 41	Incorrect Treatment duration	5 12.20
	Incorrect indication	15 36.58
	Incorrect dose	12 29.30
	Incorrect drug combinations	27 65.85
Dispensation errors N= 45	Erroneously omitted drug	2 4.44
	Medication error	7 15.55
Administration errors N= 25	Incorrect dose	8 32
	drug prescribed but unadministered	0 0
	Incorrect route	5 20
	Drug delivery rate error	16 64
	Incorrect frequency of administration	3 12

Table 5: Distribution of medication errors according to the level of errors.

Nature of errors	Frequency	Percent
Potential	29	82.9
Proven	6	17.1
Latent	0	0
TOTAL	35	100

IV. Discussion

The present study followed 41 patients who fulfilled inclusion criteria. Among the study participants, a total of 96 prescription with 347 lines of prescription medication and 3.6 lines of prescription were recorded, medication error had been reported in 36.5% of patients. Antihypertensive with 12.96% and electrolytes and fluids with 12.4% have been the therapeutic class of drugs involved in the occurrence of medication errors.

The prescription is the first step in the drug circuitry in patient care, which makes it decisive and crucial in the smooth running of the patient's therapeutic management. Indeed, any anomaly occurring at this level could affect the entire circuit.

In our study, prescription errors occupied the third position with an observed rate of 15.6%. This error rate was higher than those found in two surveys; one conducted at the Vienna Hospital Center and the other at a psychiatric hospital in Denmark which reported rates of 14% and 7% respectively [10, 11]. Authors have reported 8.8 drugs on average were prescribed per patient in a medical center in Ethiopia. Of the 882 prescriptions, there were 359 (40.7%) errors identified, with at least one prescription error identified in 24.4% of the total number of medication prescriptions [12]. Authors have reported 530 errors among the 10,070 medication orders in Boston, USA, (5.3%) [13]. In a systematic review that included 45 studies across ten (10) middle eastern countries, prescription errors ranged from 7.1% to 90.5% [14]

Prescription medication errors were intercepted following the systematic pharmaceutical validation of prescriptions. This pharmaceutical validation constitutes the basic scientific activity of the hospital pharmacist, it allow to reduce the risk of iatrogenic and improve patient safety [15]. Among the types of errors recorded during this step we found incorrect drug combination (65.8%), incorrect indication (36.6%), incorrect dosing (29.3%) and incorrect treatment duration (12.2%). Clementz et al, in 2017 in France have found that incorrect drug combinations were predominant followed by incorrect dosing and incorrect dosage form [16]. Sada O et al; in 2015 in Ethiopia have reported that omission errors (42.89%), incorrect drug combinations (28.1%), incorrect abbreviations (13.4%), incorrect dosing (8.4%), incorrect frequency of administration (5.01%) and incorrect indication (2.2%) were the most common prescribing errors identified [12]. Bates DW et al; in 1995 have reported that omission errors (53%), dosing errors (15%), incorrect frequency (8%), and incorrect route (5%) being the most frequent errors in Boston, USA [13].

During the dispensation step, only 8, 3% of errors were identified at this level of the drug circuitry. Lisby et al. reported only 3% errors [17]. However, another study conducted at the Arpajon hospital center detected 11% [18]. In our study the most common error types at the dispensing stage were medication errors with 15.5% and drug erroneously omitted with 4.4%. A study conducted by Marianne L et al, in 2005 in Denmark have reported that the most common error types at the dispensing stage were unordered or omitted doses while lack of identity control and wrong time [19]

In this study, 12.5% cases of administration error were observed and the majority were drug delivery rate error with 64%, incorrect route with 20% and incorrect frequency of administration with 12%. This result is similar to reported by Farhat Hached in Tunisia hospital in 2018 [20]. In a systematic review that included 45 studies across ten (10) Middle Eastern countries, administration errors ranged from 9.4% to 80% [21]. The most common types of administration errors were incorrect dose and incorrect frequency of administration [21]. Another study reported that omission errors accounted for 52% of transcription errors [22].

The administration of drugs is the last step in the drug

circuitry in patient care and it is therefore particularly critical and decisive in the patient's drug management [23].

The complexity of the treatments and the diversity of the methods of administration in the different departments complicate the task of the nurses and favor the occurrence of errors. In fact, the administrations are carried out by the direct intravenous route, by gravity infusion, by the intramuscular route, by the subcutaneous route, by aerosol or by the oral route. Injectable preparations are the most involved in the occurrence of medication error during this stage.

It is very important to take adequate measures to reduce administration errors to minimum possible. Many errors have been prevented by nurses due to vigilant intervention. In case of doubt about dose or diluents, nurses always confirm with the doctor before drug administration.

Most medication errors were intercepted before drug administration to the patients. These errors were in 82.9% cases of potential and in 17.1% of proven errors. Morin et al. have reported rates of 50% potential errors, 15% latent errors and 36% proven errors [24]. Another study has found a proven error rate lower than ours with 12% [25].

V. Conclusion

Medication errors were common at the University Hospital of Point G and involved errors mainly during drug prescription, administration and dispensation, which did not compromise the health of the patients.

Singles

MRTC: Malaria Research, and Training Center

USTTB: University of Sciences, Techniques, and Technologies of Bamako

EM: Medication error

FAPH: Faculty of pharmacy

ICER: International Center for Excellence in Research

Contribution

Karim Traoré, Thiery Cissé, and Sékou Bah participated in the conception and design of the manuscript. Karim Traoré, Bourama Keita, Sory I Diawara, and Drissa Konaté performed the statistical analysis, and Karim Traoré Mahamadou Ballo, Seidina AS Diakité, Modibo Sangaré drafted the manuscript. All authors read, and approved the final version of the manuscript.

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VI. References

1. Patrick M. Malone, M.J.M., Sharon K. Park, *Drug Information: A Guide for Pharmacists*, 6e. drug information, 2018.
2. Panel, V.C.f.M.S.V.P.B.M.S.H.G.a.t.M.A., *Adverse Drug Events, Adverse Drug Reactions and Medication Errors: Frequently Asked Questions*. Veterans affairs center for medication safety and veterans health administration pharmacy benefits management strategic healthcare group and the medical advisory panel. 2006: p. 4.
3. McBride-Henry, K. and M. Foureur, *Medication administration errors: understanding the issues*. Aust J Adv Nurs, 2006. **23**(3): p. 33-41.
4. Ahmed, A.H., et al., *Outcome of adverse events and medical errors in the intensive care unit: a systematic review and meta-analysis*. Am J Med Qual, 2015. **30**(1): p. 23-30.
5. Mohammad Khammarnia, F.S., *Medical Error as a Challenge in Iran's Health System*. Health Scope, 2017. **6**(1).
6. Penny J. Lewis, T.D., David Taylor, Mary P. Tully, Val Wass and Darren M. Ashcroft *Prevalence, incidence and nature of prescribing errors in hospital inpatients: a systematic review*. Drug Safety, 2009. **32**(5).
7. Mirzaei, S.V.P.K.F.M.M.A.B.S.A.J.M.A.-J.M., *Frequency and Types of Medical Errors in Infectious Patients Referred to the Emergency Department of Imam Reza (AS) Hospital in Kermanshah, Iran (2014-2015)*. Journal of Patient Safety and Quality Improvement, 2016. **4**(4).
8. Harrison, R., A.W. Cohen, and M. Walton, *Patient safety and quality of care in developing countries in Southeast Asia: a systematic literature review*. Int J Qual Health Care, 2015. **27**(4): p. 240-54.
9. Fialova, D. and G. Onder, *Medication errors in elderly people: contributing factors and future perspectives*. Br J Clin Pharmacol, 2009. **67**(6): p. 641-5.
10. Sophie Girard, B.P., Magali Hellot-Guersing, D.Pharm., Bernard Rivoire, MD, Corinne Derharoutunian, D.Pharm., Anne Gadot, D.Pharm., Charlotte Jarre, D.Pharm., Anne-Sophie Leromain, D.Pharm., Renaud Roubille, D.Pharm., *Face aux erreurs médicamenteuses, quelles sont l'expérience et la perception des professionnels de santé d'un centre hospitalier français ?* PHARMACTUEL, 2017. **50**(4).
11. Soerensen, A.L., et al., *The medication process in a psychiatric hospital: are errors a potential threat to patient safety?* Risk Manag Healthc Policy, 2013. **6**: p. 23-31.
12. Sada, O., A. Melkie, and W. Shibeshi, *Medication prescribing errors in the medical intensive care unit of Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia*. BMC Res Notes, 2015. **8**: p. 448.
13. Bates, D.W., et al., *Relationship between medication errors and adverse drug events*. J Gen Intern Med, 1995. **10**(4): p. 199-205.

14. Lisby, M., L.P. Nielsen, and J. Mainz, *Errors in the medication process: frequency, type, and potential clinical consequences*. Int J Qual Health Care, 2005. **17**(1): p. 15-22.
15. Benoit Allenet, D.C., Sonia Prot-Labarthe, A. Lepelletier, *Le plan pharmaceutique personnalisé et le nouveau modèle de pharmacie clinique*. ScienceDirect, 2017.
16. A. Clementz, J.J., A. Tchalla, F. Julia, A. Marie-Daragon, H.H. Karam, V. Ratsimbazafy *Mise en place et évaluation de validations d'ordonnances et d'interventions pharmaceutiques dans un service d'urgences adultes*. Elsevier Masson 2017. **52**.
17. Lisby M, N.L., Mainz J., *Errors in the medication process: frequency, type, and potential clinical consequences*. Int J Qual Health Care, 2005. **17**.
18. Frereau C, C.T., Toledano N., *Sécurisation du circuit du médicament : contrôle pharmaceutique de la préparation des doses à administrer*. Pharm Hosp Clin, 2014. **49**.
19. MARIANNE LISBY, L.P.N.A.J.M., *Errors in the medication process: frequency, type, and potential*. International Journal for Quality in Health Care, 2005. **17**.
20. AuG. Belhabib, H.F., O. Gloulou, M. Boussarsar, N. Chouchane, *Evaluation of medication preparation and administration practice in an intensive care department*. Le Pharmacien Hospitalier et Clinicien, 2018.
21. Alsulami, Z., S. Conroy, and I. Choonara, *Medication errors in the Middle East countries: a systematic review of the literature*. Eur J Clin Pharmacol, 2013. **69**(4): p. 995-1008.
22. Fahimi, F., et al., *Transcription errors observed in a teaching hospital*. Arch Iran Med, 2009. **12**(2): p. 173-5.
23. De Franco S, R.S., Angellotti P, Guala A, Stival G, Ferrero F, *Medication errors in neonatal intensive care unit of a tertiary care hospital in South India: A prospective observational study*. Minerva Pediatr, 2014. **66**.
24. Morin P, S.J., Saint-Lorant G, *Complémentarité' de trois dispositifs de déclaration des évènements indésirables médicamenteux*. Pharm Hosp Clin, 2015. **50**.
25. Sophie Girard, M.H.-G., Bernard Rivoire, Corinne Derharoutunian, Anne Gadot, Charlotte Jarre, Anne-Sophie Leromain, Renaud Roubille., *Face aux erreurs médicamenteuses, quelles sont l'expérience et la perception des professionnels de santé d'un centre hospitalier français ?* PHARMACTUEL, 2017. **50**(4).

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