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EVALUATION OF MEDICATION ERROR TYPES AND PATTERNS AMONG PEDIATRIC IN-PATIENTS AT ZEWUDETU GENERAL HOSPITAL

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ABSTRACT

Background: Any mistakes made in the prescription, distribution, administration, or monitoring of a medication are considered medication errors and contribute significantly to patient harm. Even though medication errors are the greatest preventable cause of patient damage, children are much more likely to die from them than adults are. **Objective:** To assess types and patterns of medication Errors among pediatrics in-patients at Zewudetu general hospital from June 2023 to August 2023. **Methods:** From June to August 2023, a cross-sectional study at Zewudetu General Hospital that included a review of medical records and patient interviews was carried out. The entire set of information regarding medication error was presented using the consecutive sampling method and descriptive statistics. **Results:** 45% of the 161 pediatric patients admitted to the pediatric wards did not have a medication error, compared to 55% who did. Documentation error made up 35.9% of all discovered pharmaceutical errors, making it the most common. The second most common pharmaceutical error (24.7%) was a dosing error. Medication mistake was more common in patients who were given antibiotic prescriptions (57.1%) and in patients who had pneumonia (55.9%). **Conclusion:** Among studied pediatric patients, greater than half of patient had medication error. Documentation error was the most medication error identified. Among medication prescribed, antibiotics were the most prescribed medication and the most class of medication with high medication error. Medication error was high among patients diagnosed with pneumonia.

KEYWORDS: Children's medication error.

1. INTRODUCTION

1.1. Background

Medication is available from health providers all over the world. However, with frequent and increasing prescription use, there is a rising risk of damage (Duerden, 2013). The significance of prudent drug usage has been well-documented in a number of articles on patient safety and healthcare quality, with a focus on the negative impact of medication errors on patient health and the requirement of reliable safety protocols.

Any mistakes occurring during the prescription, distribution, administration, or monitoring of a drug are considered medication errors, regardless of whether they have unfavorable effects or not. They are also the source of patient damage that can be avoided the most readily (Williams, 2007). Medication errors (MEs) are one of the most common and preventable causes of iatrogenic injuries and one of the most important categories of medical errors (Al-Jeraisy, 2011). In hospitalized patients, medication errors raise the risk of disease and mortality (Williams, 2007). Williams asserts that between 2 and 14% of in-patients in the US have medication errors, with between 1 and 2% of those sustaining harm.

Poor prescription is to blame for most mishaps. According to the survey, pharmaceutical errors are responsible for 1 in 20 hospital admissions and are expected to kill 7,000 patients annually. 6.5 out of every 10 adult hospital admissions and 5 out of every 100 adult drug orders result in medication mistakes (Al-Jeraisy, 2011).

Napoleon's decision to have the Duc d'Enghien executed in 1794 is supposed to have been the mistake Talleyrand thought was worse than a crime. Additionally, Antoine Boulay de la Meurthe and Joseph Fouché, Bonaparte's Minister of Police (after known as the Duc d'Otrante), have been given credit for the proverb (a deputy in the corps legislative). Nevertheless, whoever said it implied that the means were justified for the sake of the end. And while if it is not advised to break the law to prevent pharmaceutical errors, one should undoubtedly work as diligently to prevent them as one would work to avoid committing a crime.

Among the 2 to 14% of in-patients who experience medication errors, 1% to 2% of them sustain injury. Poor prescription is to blame for most mishaps. They happen in 6.5 out of every 10 adult hospital hospitalizations and 5 out of every 100 adult prescriptions (Al-Jeraisy, 2011). Prescription mistakes are found in between 3 and 20% of all prescriptions written for pediatric hospital patients and 10.1% of children seen in emergency rooms, according to the majority of large-scale studies. In the global mortality toll, medication errors account for 0.4% of all fatalities (Bourgeoiset al., 2010).

WHA68.20: Global burden of pharmaceutical error and the need for coordinated action at the country level to address its health, social, and public knowledge implications was approved by the World Health Assembly (WHA) in 2015 to address this issue. The majority of medications used in newborns are dispensed in dosages and units for kids or adults. This requires a lot of math and carries a greater risk of inaccuracy (Chan, 2001). Children's communication skills are less developed than adults', which limits their ability to inform healthcare professionals about possible medication errors. However, there hasn't been a lot of research done on the issue of medication errors and ADEs in pediatric in-patient settings. Children's continually fluctuating body surface areas and weight make them particularly susceptible to drug dose and distribution problems (Duerden, 2013).

This study is significant from a variety of perspectives. First off, nothing is known about the ME status of the target population in Ethiopia, particularly in the research area, because to the paucity of studies in this sector. This study will therefore yield vital data that can close this gap. Second, knowing the number of children with ME will help policymakers better plan for lowering the dangers brought on by these problems. Third, knowing the risk factors for ME is essential because it allows for the development of an effective strategy to reduce problems with drug therapy and so improve patient care. Finally, the results of this study will serve as a benchmark for future academics who desire to do comparable studies in the nation. Consequently, this study will evaluate pediatric patients at Zewudetu general hospital who have ME.

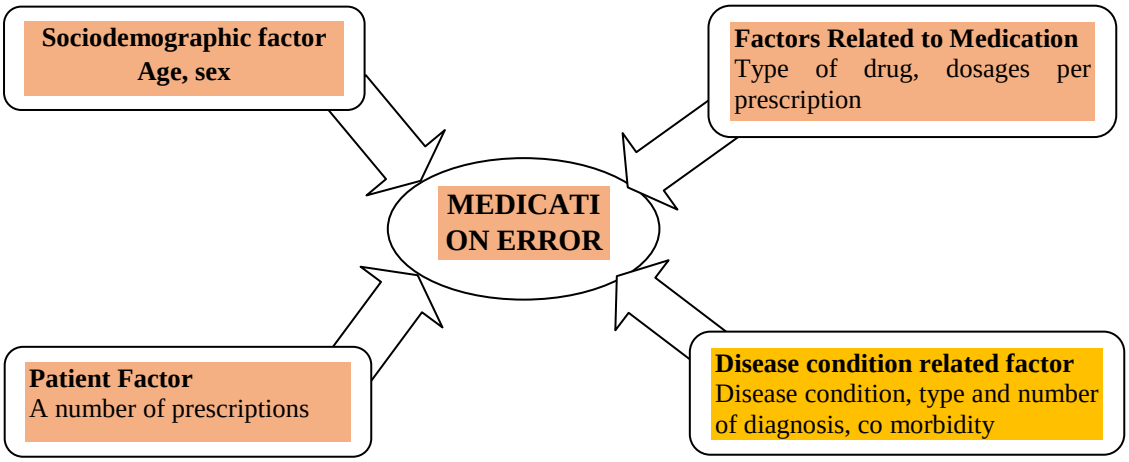

Figure 1: Conceptual Frame Work for Root Cause Analysis of Medication Error.

2. METHOD

2.1. Study area and period

The study will be conducted in Zewudetu general hospital Addis Ababa city, Ethiopia.

2.2 Study Design and Period

Hospital based cross sectional study will be made from June 2023 to Augost 2023.

2.3. Populations

2.3.1 Source Population

All pediatric patients admitted to pediatric wards of Yekatit12 Referral hospital.

2.3.2 Study Population

All pediatric patients admitted to pediatric wards of Zewudetu general hospitaand fulfill inclusion criteria.

2.4 Inclusion and Exclusion Criteria

2.4.1 Inclusion Criteria

All pediatric patients admitted to pediatric ward of Zewudetu general hospitaduring the study period will be included in the study.

2.4.2 Exclusion Criteria

Ambulatory patients or if the medication errors happen at outpatient of Yekatit12 Referral hospital. Involuntary patient's parents to review his /her patient profile card.

2.5 Sample Size Determination

The number of patient admitted to pediatric ward during study period and fulfill inclusion criteria will be included.

A minimum Sample size will be calculated by using single proportion formula

$$Ni=z^2p\ (1-p)/D^2$$

Where Z=Confidence Level
P=Estimate of the Population
D=Margin of Error.
When: Z=1.96, P=0.5, AND D=0.05
$Ni=1.96290.5(1-0.5)/\ (0.05)^2 = (1.96)^2(0.5)(1-0.5)/(0.05)^2 =384.16 \sim 384$
Using sample reduction formula, the sample size will be determined based on Study population
N=ni/(1+ni/N)
Where: Ni=Initial Sample Size
Nf = Final Sample Size
N= Total number of medication error that will be assessed.
So the Sample Size Becomes:-
Nf=384/(1+384/1000) = 147
10% is added for non-response. Thus, the sample size will be 161

2.6 Sampling Technique

Every patient who meets the inclusion criteria will be added until the study's completion using consecutive sampling.

2.7 Study Variables

2.7.1. Dependent Variables

Medication errors

2.7.2. Independent Variables

1. Socio-demographic factors: Age, Sex, Residence, Occupational status.
2. Medication related factors: Class of medications, Type of Medication, Formulation.
3. Disease condition related factors: Disease condition, Types of diagnosis, Comorbidity.

2.8 Data Collection Method

2.8.1. Instrument

The Questionnaires will be structured based on the study objective and will be designed as simple as possible to meet the knowledge of both respondent and interviewers to collect the necessary data.

2.8.2 Data Collectors Recruitment and Training

The numerators will be selected from students of health science, more specifically from pharmacy because they are expected to have better awareness regarding this issue.

2.8.3 Data Quality Control

To assure the quality of the collected data, the following measure will be taken. The appropriately designed data collection instrument will be used. The data collection format will be pretested. Every day the collected data was reviewed and checked for completeness and consistency.

2.8.4. Data Analysis

The collected data was entered into a computer analyzed using SPSS version 21. Result of the study was organized in the form of frequencies and percentages. The data was summarized and described using tables and figures.

2.9 Ethical Consideration

Before beginning the actual data collection, Africa Medical College of Health Sciences provided ethical clearance and approval for the study. Patients' participation in this study was completely voluntary, confidential, and safeguarded private information like name and address. Before any data is collected, each participant will be required to sign a signed informed consent. Participants' choice to decline to participate or leave the interview was honored. Using the patient's guard, the interviewer respected the patients' privacy.

2.10. Operational definitions of terms

Medication errors: Are defined as any preventable event that may lead to inappropriate medication use or patient harm while in control of a health care provider, caregiver, or patient. They may be related to professional practice, medication, procedures of medication use or failure in systems (Rothschild et al., 2010).

Selection errors: Are defined as selecting the wrong drug for correct diagnosis, prescribing drugs that are contraindicated in a patient, drug duplications.

Dosage errors: Are errors occurring due to over dosage, under dosage, undecided dosages, wrong strength, and wrong dosage form or dose omission.

Documentation errors: Are defined as errors occurring due to; transcribing errors, use of brand names, illegibility, dangerous abbreviations, preceding zeroes, trailing zeroes and missing contact information of the prescribers.

Monitoring errors: Include errors due to lack of ordering monitoring parameters during use of a drug, or failure to follow up prescribed monitoring.

Timing errors: Involved either use of wrong duration, wrong frequency, missing duration, or frequency.

Omission errors: Are errors occurring where an action to be done is not performed. This included failure to administer a drug or complete failure to prescribe a drug.

3. RESULT

3.1. Socio-Demographic Characteristics

A total of 161 pediatric in patient cards were examined for the current investigation. Male patients made up 83 (51.5%) of the pediatric patients studied, while female patients made up the remaining 78 (48.5%). The age distribution reveals that the majority of patients are between the ages of 1 and 5 (69.5%). The patient's most common complaints were coughing 53 times (32.9%), followed by vomiting 22 times (13.6%). Fever was one of the other frequent complaints, followed by convulsions (12.4%), difficulty breathing (14.6%), and diarrhea (13.0%). The majority of children complained about multiple things. 90 cases of pneumonia (55.9%) were diagnosed, followed by 15 cases of appendicitis (9.3%), 12 cases of asthma (7.4%), 12 cases of neonatal sepsis (7.4%), 11 cases of amebiasis/giardiasis (6.8%), and 9 cases of SAM (5.6%).

Table 1: Socio demographic characteristics of pediatric patients Zewudetu general hospital.

Socio demographic data		Frequency	Percentage (%)
Sex	Male	83	51.5
	Female	78	48.4
Age	<1 year	22	13.6
	1-5 year	112	69.5
	6-14 year	27	16.7
Chief compliance	Cough	53	32.9
	Fever	22	13.6
	Diarrhea	21	13.0
	Vomiting	22	13.6
	Swelling /tenderness	17	10.5
	Difficult of breathing	14	8.6
	Convulsion	12	7.4
Diagnoses	Malaria	4	2.4
	Pneumonia	90	55.9
	Meningitis	8	4.9
	Sepsis	12	7.4
	SAM	9	5.6
	Asthma	12	7.4
	Appendicitis	15	9.3
	Amebiasis/giardiasis	11	6.8

3.2 Type of medications

The commonly prescribed class of medicines was antimicrobials with 92(57.1%) instances of antimicrobial prescribing among the study cohort. In many cases, the second and third most commonly prescribed drugs were supplements at 19(11.8%) and anti-helminthic at 10(6.2%) prescribing instances (table 2).

Table 2: Medicines Prescribed in pediatric admission in Yekatit 12 Refereal hospital from February 2022 to June 2022.

Types of medication	Class of medication	Frequency	%
Medicines Prescribed	Antimicrobials	92	57.1
	Antimalarial	7	4.3
	Bronchodilators	7	4.3
	Anticonvulsants	8	4.9
	Antidiarrheals	8	4.9
	Supplements	19	11.8
	Analgesics	10	6.2
	Anthelminthic	10	6.2

The most common type of pharmaceutical error, accounting for 32 (34.9%) cases, was documentation error. The rate of missing information was highest in this category of errors (14; 15.8%), followed by abbreviation (11; 12.3%), and brand name use (7; 7.8%). Dosing errors, which made up 22 (24.7%) of the total prescription errors, were the second most common form of error, followed by selection errors, which made up 16 (17.9%). Twelve (13.4%) monitoring mistakes were recorded. Either monitoring was not requested, or it was

requested but not performed and at the incorrect frequency. The least common type of pharmaceutical errors, accounting for 7 (7.8%) of all errors, were omission errors. Out of 161 treatment sheets and files examined, 89 included various pharmaceutical mistakes. These mistakes were divided into several groups, including dosing, monitoring, and documentation. Choosing and leaving out.

3.3 Type of medication errors

Table 3: Type of medication errors among study participants.

Type of Error	Number of errors(n)	Percentage (%)
Documentation	32	(35.9%)
Use of brand name	7	(7.8%)
Abbreviations	11	(12.3%)
Missing information/	14	(15.8%)
Dosage errors	22	(24.7%)
No dosage indicated	6	(6.8%)
Wrong strength	11	(12.3%)
Dose omission	5	(5.6%)
Monitoring Errors	12	(13.4%)
Not requested	7	(7.8%)
Requested not done	2	(2.2%)
Wrong frequency	3	(3.4%)
Selection	16	(17.9%)
Unnecessary drug	11	(12.3%)
Contraindicated drugs	5	(5.6%)
Omission errors	7	(7.8%)
Failure to prescribe Medication	3	(3.4%)
Failure to administer Medication	4	(4.4%)

4. DISCUSSION

Pneumonia was the most frequently diagnosed condition in this cohort, accounting for 55.9% of all admissions. Asthma and appendicitis come next. Medication errors can be serious or even dangerous when they occur during the prescription or administration of medications. When they do, juvenile patients are at significantly greater risk than adults.[4] According to the current study, which looked at 161 pediatric inpatient treatment sheets and files, medication errors may affect anywhere between 5% and 10% of all pediatric in-patients. Recently, the use of acronyms in medicine prescriptions has drawn a lot of attention and grown into a global issue as one of the main factors contributing to drug errors. According to Al- Jeri Say et al., 75% of all orders had abbreviations.[20] Although it saves time and space, employing acronyms can occasionally prove to be highly costly because they can be misleading, have double meanings, and cause errors. The National Coordinating Council for Medication Error Reporting and Prevention states that the patient's age, weight, and height should be included on the prescription or medication order along with other crucial details like the dosage form, dose, and administration route. The safety of the patient may be seriously compromised when prescriptions are incomplete. Sex, height, frequency, length of administration, prescriber, patient weight, and mode of administration were among the details that were lacking. The use of brand names can result in a number of mistakes, particularly when it comes to drugs that sound similar but are not. Commercial brands tend to be more expensive, which increases the risk of omission errors and limits treatment adherence.[17]

7. CONCLUSION

More over half of the pediatric participants in the study had taken the wrong medication. The most common type of pharmaceutical error was a documentation error. Antibiotics were the most commonly prescribed prescription and the class of medication with the highest rate of medication mistake. Patients with a pneumonia diagnosis experienced a significant rate of medication errors. To avoid pharmaceutical errors, Zewudetu General Hospital must work with the Addis Abeba Administration Health Bureau to give training about the reporting of pediatric medications. There should be more research done on the prevalence and causes of pharmaceutical errors.

LIST OF ABBREVIATIONS AND ACRONYMS

AIDS: Acquired Immune Deficiency Syndrome
GPW: General Pediatric Ward
ME: Medication Errors
PD: Pediatric ward
SAM: Sever acute malnutrition
WHA: World Health Assembly
WHO: World health organization

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