

## **Evaluation of Medication Errors in Pediatric Outpatient Department**

**\*Balram B<sup>1</sup>, Surender Kagitapu<sup>1</sup>, Mahesh A<sup>2</sup>, Raja Babu K<sup>2</sup>**

<sup>1</sup>*Department of Pediatrics, Kakatiya Medical College, MGM Hospital, Warangal, Telangana, India-506002*

<sup>2</sup>*Department of Clinical Pharmacy, Vaagdevi College of Pharmacy, Hanamkonda, Warangal, Telangana, India*  
*Corresponding author: \*Balram B*

### **I. Introduction**

Medication errors defined as any error in the prescribing, dispensing or administration of a drug whether there are adverse consequences or not, are the single most preventable cause of patient injury [1, 2]. These errors can occur at any stage in the drug use process from prescribing to administration to the patient. A recent report by the Institute of Medicine (IOM) estimated that errors in medical management cause between 44,000 and 98,000 deaths each year in USA hospitals [3]. In the USA it has been suggested that the rate of serious medication error is approximately 7% [2]. Medication errors are not confined to the hospital setting. Reports from the Medical Defence Union and the Medical Protection Society revealed that 25% and 19%, respectively, of legal claims against general practitioners related to medication errors [4, 5]. The occurrence of medication errors can compromise patient confidence in the healthcare system and in addition, increase healthcare costs [6]. Economic consequences may include the award of damages to the patient, extension of a patient's stay in hospital and the potential financial support required for long term care of a patient who suffers permanent injury [7]. In the USA, it has been estimated that the cost of adverse drug events, a proportion of which are due to medication errors, was \$5.6m per year for a 700 bed teaching hospital [8]. Prescribing errors may be defined as an incorrect drug selection for a patient, be it the dose, the strength, the route, the quantity, the indication, the contraindications [9]. This definition can be further expanded to include failure to comply with legal requirements for prescription writing. The prescriber must specify the information which the pharmacist needs to dispense the drug in the correct dosage and form and the directions the patient needs to take it safely [10, 11]. A study undertaken in the hospital setting by Lesar et al found an error rate of 4 errors per 1000 medication orders. Of the errors with potential for adverse patient effects, drug allergies accounted for 12.1%, wrong drug name, dosage form or abbreviation for 11.4% incorrect dosage calculations for 11.1% and incorrect dosage frequency for 10.8% [12]. Dispensing errors are errors that occur at any stage during the dispensing process from the receipt of a prescription in the pharmacy through to the supply of a dispensed product to the patient [13]. Studies in the USA have estimated that dispensing errors occur at a rate of 1-24%.

Dispensing errors may undermine the patient's confidence in the pharmacist and increase the likelihood of litigation procedures [14]. These errors include the selection of the wrong strength/product. This occurs primarily when two or more drugs have a similar appearance or similar name (look-a-like/sound-a-like errors – Table 1). The use of computerised labelling has led to the emergence of transposition and typing errors which are among the most common causes of dispensing error [15]. Other potential dispensing errors include wrong dose, wrong drug, wrong patient. A drug administration error may be defined as a discrepancy between the drug therapy received by the patient and the drug therapy intended by the prescriber [16]. Drug administration is associated with one of the highest risk areas in nursing practice. The "five rights" have long been the basis for nurse education on drug administration i.e. giving the right dose of the right drug to the right patient at the right time by the right route [17]. Drug administration errors largely involve errors of omission where administration is omitted due to a variety of factors e.x wrong patient, lack of stock. Other types of drug administration errors include wrong administration technique, administration of expired drugs and wrong preparation administered. The problems and sources of medication errors are multidisciplinary and multi-factorial [9]. The action of one individual alone is rarely the solitary cause of a medication error or incident, rather a variety of contributing factors combine to cause incidents.

Contributing factors to prescribing error occurrence include: [17, 18].

- Illegible handwriting
- Inaccurate drug history taking
- Drug name confusion (Table 1)
- Inappropriate use of decimal points
- Use of abbreviations
- Use of verbal orders

Irrespective of how accurate or complete a prescription is, it may be misinterpreted if it cannot be read. While the prescriber has a professional responsibility to issue a safe and legible prescription, haste, fatigue or a lack of understanding of the importance of clear prescribing may contribute to illegibility. In addition, poorly written prescriptions may delay administration of medications [6, 19, 20]. Computer generated prescriptions can help reduce the risk of prescribing errors due to illegible handwriting, although they in turn may give rise to further problems such as incorrect drug selection. Lack of knowledge of the prescribed drug, the recommended dose and the patient may also contribute to prescribing errors. One of the most important causes of dispensing errors is confusing the name of one drug with another (Table 1) [10]. Lack of knowledge on new medicines and the use of outdated and/or incorrect references can also be a contributory factor [13]. Other factors include poor dispensing procedures with inadequate checking, unreasonable workloads and poor housekeeping standards. Studies have also supported an association between dispensing errors and lighting levels, prescription workload and noise. It is suspected that distractions and interruptions can lead to performance errors [14]. In addition, not challenging unusual doses, dispensing unfamiliar products, dispensing before seeing a written order may lead to errors [21]. Contributing factors to drug administration errors include failure to check the patient's identity prior to administration and storage of look-a-like preparations side by side in the drug trolley. Environmental factors such as noise, interruptions while undertaking the drug round and poor lighting may also contribute to error. The likelihood of error is also increased where more than one tablet is required to supply the correct dose or where a calculation to determine the correct dose is undertaken. Medication errors can be prevented by alterations in the system for ordering, dispensing and administration of drugs [22]

The potential for medication error occurrence in the Irish Healthcare system exists and must be addressed. Ensuring that up-to-date reference sources are available to healthcare professionals will help to minimize errors due to lack of knowledge. The use of computerized physician order entry systems have been shown to reduce medication errors however the use of information technologies will not, on their own, solve the problems. Other methods of minimizing prescribing errors include:

- Ensuring Knowledge Of A Drug Before Prescribing
- Ensuring An Accurate Drug History Is Taken
- Printing The Drug Name And Patient Details Clearly On The Prescription
- Including All Details Of Drug Therapy I.E. Name Of Drug, Dose, Directions, Duration Of Therapy
- Not Leaving A Decimal Point "Naked". A Zero Should Always Precede Expression Of Values <1 E.G 0.1. Ten-Fold Errors In Dose Have Occurred Due To The Use Of A Trialing Zero.
- Avoiding The Use Of Abbreviations E.G. Azt, Ismn, Feso4, U
- Being Aware Of Sound –A-Like Products [20].

Information Has Been Published By The Pharmaceutical Society Of Ireland For Pharmacists On How To Deal With Dispensing Errors [23]. Reductions In Dispensing Errors Can Be Helped By:

- Ensuring A Safe Dispensing Procedure
- Using Different Brands Or Separating Products That Look-A-Like
- Focusing On The Task In Hand, Keeping Interruptions To A Minimum And Maintaining Their Workload At A Safe And Manageable Level
- Being Aware Of High Risk Drugs E.G. Potassium Chloride, Cytotoxic Agents
- Introducing Good Housekeeping Practices [13, 14, 20].
- Checking Patients Identity
- Having Dosage Calculations Checked Independently By Another Healthcare Professional Before The Drug Is Administered
- Having The Prescription, The Drug And The Patient In The Same Place So They Can Be Checked Against One Another
- Ensuring That Medication Is Given At The Correct Time
- Minimizing Interruptions during Drug Rounds [24].

## **II. Aims & Objectives**

- To Assess The Prescribing And Dispensing Errors In Pediatric Out Patients
- To Enhance Patient Safety.
- To Identify Common Types Of Errors In Pediatric Population.
- To Prevent From Future Medication Errors.
- To Educate Health Care Professionals And Patients.
- To Reduce Liability.
- To Minimize The Recurrence Of Errors.

### III. Need of Study

- Over 90,000 People Die Annually As A Result Of Medical Errors -7,000 From Medication Errors.
- Pediatric patients are very sensitive and there are no such studies have been done in our hospital.

### IV. Materials & Methods

It is a prospective, observational study conducted in outpatient department of Pediatric ward in MAHATMA GANDHI MEMORIAL HOSPITAL (MGMH), Warangal. The numbers of patients recruited for the study were 1002. Among these 184 cases were found to have dispensing errors and 2 were found to have prescription errors.

#### The dispensing errors as follows:

- Expired drug
- Labeling of the drug
- Wrong drug
- Wrong dosage form
- Incomplete dispensing due to out of stock

#### The prescription errors as follows:

- Dose errors
- Frequency errors
- Time & duration errors

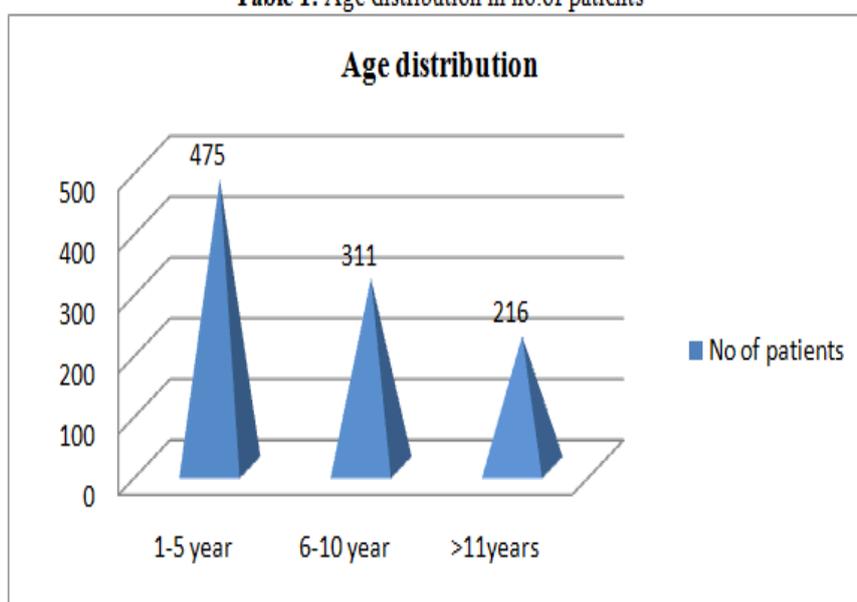
The study was carried out for 6months from May 2015 to October 2015. All pediatric out patients were considered in the study. It is a prospective observational study; in which pediatric outpatient prescriptions were collected we found both prescription and dispensing errors. Data was entered in Microsoft Excel and Results were extracted by using Graph pad Prism-5 and Microsoft Excel.

### V. Results

A total of 1002 pediatric patients were included and completed the study. The mean-age of study population (n=1002) was 7.736±4.383 years. Majority of the patients were in between the age group 1-5 years (47.4%), and least number of patients were in the age group of >11 years(21.5%).

Age distribution (years)	No of patients	Percentage (%)
1-5	475	47.4%
6-10	311	31.0%
>11	216	21.5%

**Table 1:** Age distribution in no.of patients



**Figure 1:-** Age distribution in no. of patients

Number of female patients found to be 504 and number of male patients found to be 498. Females are high in the percentage of 50.2% and the male percentage of 49.7%.

Gender distribution	No of patients	Percentage (%)
Male	498	49.7%
Female	504	50.2%

Table 2:- Gender distribution

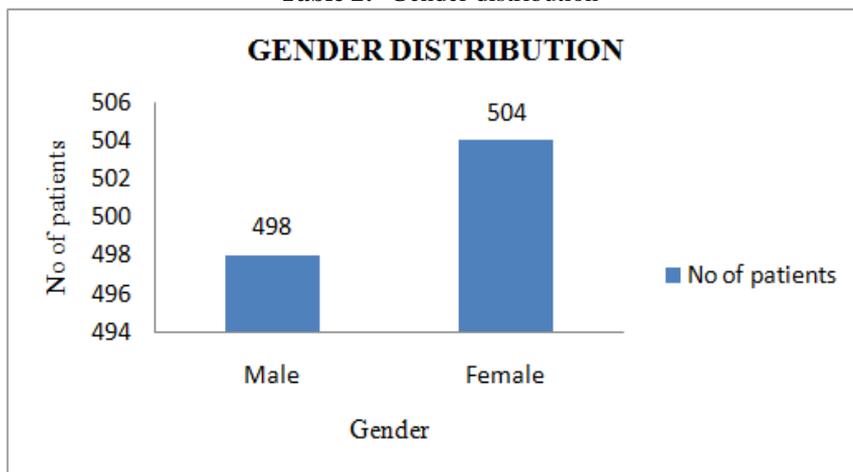


Figure 2:-Gender distribution

**The medication errors types:**

1. Prescription errors
2. Dispensing errors

The prescription errors were found to be 2 and the percentage is 0.19% it's again classify into the

1. Dose errors 2 the percentage of 0.19%
2. Frequency errors 0 the percentage of 0%
3. Time errors 0 the percentage of 0%
4. Duration 0 the percentage of 0%.

Medication errors	No of errors	Percentage( %)
<b>Prescription errors</b>	2	0.19
Dose error	2	0.19
Frequency error	0	0
Time error	0	0
Duration error	0	0

Table 3:- Types of prescription errors

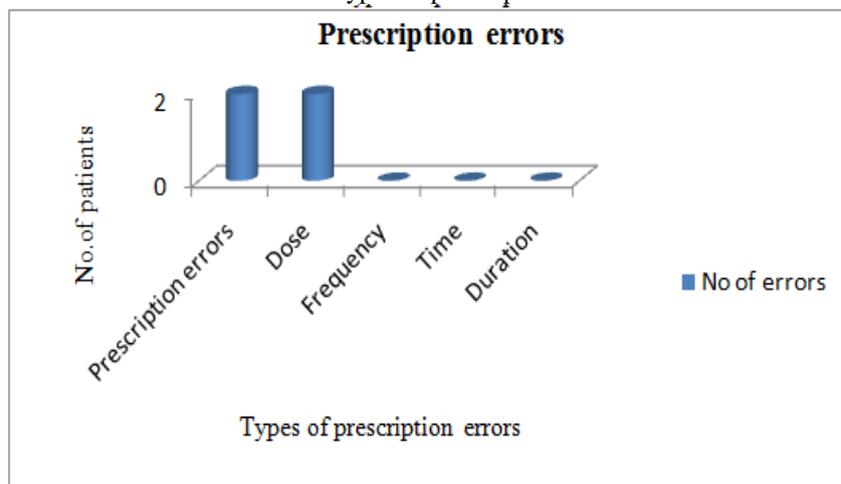


Figure 3:-Types of prescription errors

The dispensing errors were found to be 184 and the percentage is 18.3%.

Medication errors	No of errors	Percentage %
Dispensing errors	184	18.3
Expiry date error	0	0
Labeling error	0	0
Wrong-drug error	10	0.99
Wrong dosage form	77	7.6
Incomplete dispensing due to out of stock	97	9.6

## VI. Conclusion

In the study we evaluated the prescription and dispensing errors were recorded in pediatric out-patient department. The majority of evaluated dispensing errors were identified in the pediatric OP patients. To identify common types of errors in pediatric population, to enhance the patient safety, to prevent from future medication errors, to improve compliance and to educate health care professionals and patients.

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