

Medication Error in Pediatric Outpatient Prescription in a Tertiary Care Institute

Hansmukh Jain*, Pratap Kumar Patra**

Author Affiliation

*Assistant Professor, College of Nursing, **Assistant Professor, Department of Paediatrics, All India Institute of Medical Sciences, Patna, Bihar, India.

Reprint Request

Hansmukh Jain, Assistant Professor, College of Nursing, All India Institute of Medical Sciences, Patna-801507, Bihar, India.

E-mail:

drhansmukhj@aaimspatna.org

Received on | April 20 | 2017

Accepted on | May 09 | 2017

Abstract

Objective: To determine the medication errors in Pediatric outpatient practice at a tertiary care institute, Eastern India. *Design:* Hospital based cross sectional study. *Place and Duration of the Study:* Pediatric outpatient department of the All India Institute of Medical Sciences, Patna, 2014 May and June. *Methodology:* 40 outpatient pediatric prescription were evaluated for drug dosage error. *Results:* Out of 40 prescription papers 4(10%) there was no mentioned of provisional clinical diagnosis and seven Papers (17%) had dosage error. In 21 (52.5%) cases there was no mention of route of administration of the drugs. *Conclusion:* Dosing error in paediatric outpatient department is a common problem. Training regarding writing of prescription is essential for the residents before they are posted in paediatrics OPD. Intermittent continuous medical education of residents are required on regular basis.

Keywords: Medication; Pediatric; Medication error.

Introduction

Medication error is one of the most common type of medical error that contribute to the morbidity of children in outpatient department. Medication error potential to cause more harm within the paediatric population than in the adult population. The dosing error is more common in children than adults because of weight base dose calculation, fractional dosing (e.g. mg vs Gm), and the need for decimal points [1].

Previous study has been shown that dosing errors occurs in up to 17.8% of hospitalised children. There are limited studies available regarding dosing error in children in paediatrics outpatient and inpatient department. Knowing where and when error occurs will be the first step to try to avoid these errors. As there are few studies exist from the developing country on this issue we conducted a pilot study in our institute to detect the frequency of dosing error in paediatric outpatient prescription.

Methodology

This was a cross-sectional study carried out in outpatient department of Paediatrics of All India Institute of Medical Sciences, Patna, during the month of May and June year 2014 after obtaining approval from Institute Ethics committee. The Paediatric outpatient department caters around 40 to 50 patient per day. The Institute provided tertiary and subspecialty care in Paediatrics and manned by one consultant and four senior resident. It caters patient not only from Bihar but also nearby state such as Jharkhand and Uttar Pradesh and neighbourhood country Nepal. All children who visits to paediatric OPD were seen by trained senior resident in Paediatrics and each case is discussed with consultant for the plan of care. The senior residents were aware that their prescription being audited. Each day randomly five OPD prescriptions sheet were collected over eight days. The copy of original prescription sheet was analysed for the basic drugs use and medication errors. The information about

children age, weight also gathered. All the drugs prescribed were recorded including each drug dose, route, dosage form, and strength, frequency of administration, indication for which prescribed and duration of therapy. These recorded form were also analysed for average number of drug prescription, number of prescription containing antibiotics, percentage of drugs containing generic drug name, Iron, multivitamin, calcium and vitamin D preparation. For drugs dosages and duration of therapy, the *drug dosage for children* book by Dr. Meherban Singh, eighth edition used as referral book. All the DATA were entered and analysed in SPSS version 20. Quantitative data were represented as mean, and standard deviation where qualitative data were represented as proportion.

Results

Total 40 prescriptions are collected and were checked for containing any dosage error in it. The basic demographic profile of these 40 children's are depicted in Table 1. Out of 40 prescription papers 4 (10%) there was no mention of provisional clinical diagnosis and seven Papers (17%) had dosage error. The medication error were common amongst prescription of H2 blockers, diethyl carbamazepine citrate, H1 blocker (Cetirizine), calcium carbonate, antibiotics such as amoxicillin and clavulanic acid combination. In 21 (52.5%) cases there was no mention of route of administration of the drugs. The drugs which were prescribed to these children are mostly in syrup form (27.5%) cases

followed by tablet (20% cases), in capsule form (17.5%) cases. In 10% cases children received these drugs in all three forms. The average frequency of drug administration per day was 1.8 times with standard deviation of 0.96 times with range of 1 time to maximum of 5 times in a day. In 45% cases the drugs are administered once daily. In 27.5% cases drugs are administered two times a day and in 25% cases three times a day. The median duration of drug administration was 30 days. Out of 40 cases there was no mention of duration of therapy in 5 (12.5%) cases. Each prescription contains around 2.4 numbers of drugs with standard deviation of 1.29. The minimum number of drug in a prescription was one, and maximum was six. Prescription analysis were also done to know about prescription containing generic name because the All India institute of Medical Sciences OPD also has pharmacy store which sales medicine of generic name only. However detailed analysis revealed only (5) 12.5% of prescription contained generic name. Misuse of antibiotics is not uncommon in developing world, and we found that only 5 (12.5%) prescription sheet had mentioned of antibiotics. There is a notion that micronutrient and iron deficiency would be prevailing in this part of country as malnutrition is quite a common problem with this part of world. Therefore prescription were also looked for prescription of iron-, multi vitamins, calcium and vitamins D. The prescription of Iron syrup was noticed in 22 (55%) cases. In 16 (35%) there was prescriptions of multivitamins. It was found that 7 (17.5%) prescription had contained vitamin D and calcium preparation.

Table 1:

Age (Years)	Minimum 0.2	Maximum 15	Mean \pm SD 8.03 \pm 4.5
Weight (Kg)	4.7	55	23.7 \pm 14.4
Sex	Male(22)	Female(18)	
Religion	Hindu(30)	Muslim(10)	
No. of drugs in each prescription	1	6	2.4 \pm 1.7

Discussion

The prescription of medicine is an integral part of provision of health and represents a relatively safe, effective and inexpensive mode of treatment. Third world country spends around 30-40% of their budget on health care many of which are prescribed irrationally. These countries double their expenditure on drugs every four years while gross national product double every 16 years [2].

For an effective utilisation of resource spent on drugs it is essential that the prescribing and administration of the drug must be evaluated from time to time to quantify the error in it and to look for possible solution for it. The error of omission is where prescription is incomplete in some ways whereas error of commission containing incorrect information. This study was carried out over 15 days in the month of May. The study included children less than 15 years of age. The male to female higher ratio reflected that more male patient visiting the outpatient

department than female patient. According to Tiwari et al [3] the most common reason for visiting the outpatient department was upper respiratory tract infection. However we did not get similar disease profile in our condition which may be explained by that the data were collected and study was done during the summer season. The drug dosage error in our study found to be 17.5%. Prior studies have demonstrated a dosing error up to 17.8%. Our studies also has got similar incidence rate as far as dosing error in paediatric OPD patient are concerned. The reason for this degree of dosing error occurs because of not referring drug dosage book children while prescribing and it was observed in the cases where paediatrician is either unfamiliar to the drugs. There is 2.4 drug is prescribed in each prescription. Which is less compared another study conducted in Mumbai by karande et al [4] where average number of drugs were 2.9. In a similar study from Nigeria [5] the number of drug was 3.1 per prescription.

Fixed drug formulation is one of the commonest error found by Pandey et al [6]. However we did not find any such prescription in our study. According to a prior study by Ahalwat et al [7] the antibiotics prescription is as high as 37.9%. Studies by Amne et al [8] reported that up to 33.9% prescription contained antimicrobial agents. We found only 12.5% of prescription had contained antibiotics. This is most probably due to strict antibiotics policy and guideline that is adopted by the department of paediatrics. The dosing error was found up to a significant proportion in our conditions despite posting of senior resident after three year of post graduate training programme. We could envisage the incidence of medication error will be higher where doctors with MBBS degree will be working as care provider to these groups. Presently more focus has been shifted towards the prescription of generic medicine as it happens to be cheaper and produce less economic burden to the patient. However in our study we found only 12.5% of prescriptions were generic and rest 82.5% drugs prescribed are various brands name. Which is far less as compared to Ravindra et al [9], who reports that 43% prescription of paediatrics contained generic name. This suggests that it is very important to caluminate a behaviour of writing generic medicine in our residents. It was also found that a significant proportion of our prescription containing iron prescription with maximum duration up to 180 days. However all these prescription were only empiric iron therapy without documenting any haemoglobin value or iron deficiency state in a significant proportion of cases. The prescription of multivitamins was up to 35% cases. Which can be corroborate to the occurrence of micronutrient

deficiency and various grade of malnutrition in this part of country. We found very less number of prescription containing Vitamin D and calcium preparation. Another important observation that was borne out was that 24(60%) of prescription doesn't contain strength of drugs prescribed. Which emphasize that training regarding writing of prescription is essential to the residents before they are posted in paediatrics OPD.

Nursing Implications

1. **Implication for Nursing Practice** This study also implied the needs for integrated series feedback, follow up in collaborative approach in hospital.
2. **Implication to Nursing education**
The nurses should update knowledge in Medication error which is one of the most common type of medical error that contribute to the morbidity of children in outpatient department. Medication error potential to cause more harm within the paediatric population than in the adult population. The dosing error is more common in children than adults because of weight base dose calculation, fractional dosing (e.g. mg vs Gm), and the need for decimal points.
3. **Implication to Nursing Administration**
The Nursing Administrator should take active Participation in health policy development protocol, drug dosage calculation and standard procedure, medication orders regarding drug Administration
4. **Implication to Nursing Research**
The study helps the nurse Researcher to develop insight into the identification and Prevention of errors in prescription of drugs.

Conclusion

1. Dosing error in paediatric outpatient department is a common problem.
2. 17.5% dosing error was found in this study.
3. 60% of prescription didn't mention about the strength of medication in it.
4. Iron prescription was empirically found in significant number of cases.
5. It is prudent to do haemoglobin level and peripheral smear to rule out iron deficiency anaemia before prescribing long term iron

therapy.

6. The role of prescribing multivitamin therapy is unclear unless the signs of micronutrient deficiency are present.
7. Dosing error can be avoided by simply referring the drug dosage manual while prescribing any drugs
8. Continue medical and nursing education regarding how to write of prescriptions is essential for the doctors in a schedule interval in regular basis.

Recommendations

1. Replication of this study may be done in different settings
2. A comparative study may be conducted in to assess the difference between prescription errors in other medical colleges with in the city, secondary level and grass root level health care prescriptions to identify the severity and types of errors in country.
3. A study can be conducted to identify errors of prescriptions on different levels of health care delivery system.
4. Nurses working in different settings of hospital can conduct numerous studies on drug administration right dose calculation strategies and policies in practices in units, wards.

References

1. Kaushal R, Bates DW, Landrigan C, et al. Medication errors and adverse drug events in pediatric patients. *JAMA*. 2001;285(16):2114-2120.
2. Ghaleb MA, Barber N, Franklin BD, et al. Systemic review of medication errors in pediatric patients. *Ann Pharmacother*. 2006;40(10):1766-1776.
3. Koren G, Barzilay Z, Greenwald M. Tenfold errors in administration of drug doses: a neglected iatrogenic disease in pediatrics. *Pediatrics*. 1986;77(6):848-849.
4. Koren G, Haslam RH. Pediatric medication errors: predicting and preventing tenfold disasters. *J Clin Pharmacol*. 1994;34(11):1043-1045.
5. Wong IC, Ghaleb MA, Franklin BD, Barber N. Incidence and nature of dosing errors in paediatric medications: a systematic review. *Drug Saf*. 2004;27(9):661-670.
6. Glover ML, Sussman JB. Assessing pediatric residents' mathematical skills for prescribing medication: a need for improved training. *Acad Med*. 2002;77(10):1007-1010.
7. Naqvi SH, Dunkle LM, Timmerman KJ, et al. Antibiotic usage in a pediatric medical center. *JAMA*. 1979;242(18):1981-1984.
8. Van Houten MA, Luinge K, Laseur M, et al. Antibiotic utilisation for hospitalised pediatric patients. *Int J Antimicrob Agents*. 1998;10(2):161-164.
9. Cohen MR. Medication Errors. Principles and Techniques of Safe Medication Use. American Pharmaceutical Association. Washington, 1998.
10. Levy SB, Marshall B. Antibacterial resistance worldwide: causes, challenges and responses. *Nat Med*. 2004;10(suppl 12):S122-1291
11. Trinkle R, Wu JK. Errors involving pediatric patients receiving chemotherapy: a literature review. *Med ped Oncol* 1996;26:344-51.
12. MacKay MW, Holley M, Cash J, et al. Dose standardization of oral liquid medications in a pediatric hospital. *Hosp Pharm*. 2005;40:582-587.
13. McPhillips H, Stille C, Smith D, et al. Potential medication dosing errors in outpatient pediatrics. *J Pediatr*. 2005;147(6):761-767.
14. Rowe C, Koren T, Koren G. Errors by paediatric residents in calculating drug doses. *Arch Dis Child*. 1998;79(1):56-58.
15. Melrose D. Double deprivation public and private drug distribution from the perspective of the third world's poor. *World Dev*. 1983;11:181-6.
16. Tiwari P, Ahlawat R, Gupta G. Pattern of prescribing at a paediatric outpatient setting in northern India. *Indian Journal of Pharmacy Practice*. 2012;5(1):40-4.
17. Karande S, Sankhe P, Kulkarni M. Patterns of prescription and drug dispensing. *Indian J Pediatr*. 2005;72:117-21.
18. Nwolis CE, Erinaugh EU, Ofoleta SI. Prescribing practices of doctors attending to under-fives in a children's outpatient clinic in Owerri, Nigeria. *J Trop Pediatr*. 2006;52:197-200.
19. Pandey A, Thakur SB, Bhatkule RP. Prescription Analysis of Pediatric Outpatient Practice in Nagpur City. *Indian J Community Med*. 2010 Jan;35(1):70-73.
20. Ahlawat R, Tiwari P, Gupta G. Assessment of prescribing at a private pediatric outpatient setting in northern India. 2013;1:21-23.
21. Amne H, Priyadarshini K. Prescription analysis to evaluate rational use of Antimicrobials. *International Journal of Pharma and Bio Sciences* 2011;2:318-324.
22. Ravindra KS, Shinde R, Hagwane T. Cross Sectional, Observational Study to Assess Prescription Practices of Physicians with Respect to Use of Generic Medicines. *Int. J. Pharm. Sci. Rev. Res.*, 25(1), Mar-Apr 2014;14:90-96.
23. Wong's, David Wilson Clinical Manual of Pediatric

- Nursing 4th edition lippincott manual.
24. Cox ER, Halloran DR, Homan SM, Welliver S, Mager DE... Trends in the prevalence of chronic medication use in children: 2002-2005. *Pediatrics*. 2008;122(5).
 25. Kaushal R, Bates DW, Landrigan C, et al. Medication errors and adverse drug events in pediatric inpatients. *JAMA*. 2001;285(16):2114-2120.
 26. Lippincott Manual of Nursing Practice, 10th Edition, Lippincott Williams & welkin's pg 424-1430.
 27. Dorothy Marlow, Barbara A Redding Marlow's Textbook of Pediatric Nursing, South Asian edition, Elsevier publication 6th edition, 204-5.
-