

Timely detected medication error: Prescribing or dispensing?

Sir,

Medication error is failure in the treatment process that leads to or has the potential to harm the patient.^[1] The treatment process encompasses all spectrum of medical care, i.e., diagnosis, treatment as well as prevention of disease. It also includes manufacturing or compounding, prescribing, transcribing, dispensing, and administration of a drug and the monitoring of its effect. Error in any of the component of the treatment process can lead to either the adverse event or the treatment failure.^[2] This error arises when action is intended but not performed either due to poor planning because of inadequate knowledge, or because of imperfect execution of a well-formulated plan because of negligence.

A prescription is a written order which includes detailed instruction of what medicine should be given to whom, in what formulation and dose, when, by which route and for how long. Prescribing error is failure in the prescription writing process that results in a wrong instruction about one or more features of the prescription.^[3] The dispensing error on the other hand is the discrepancy between the prescription and the medicine the pharmacist delivers to the patient.^[4] A prescriber is always a doctor and most of the times drug is dispensed by a pharmacist. There are many pieces of evidence which indicate that a poor communication between them underlies the many medical errors.^[5] In pediatric patients prescribing as well as dispensing error is important as dose is calculated on the individual patient basis depending upon age, weight, and surface area of the child and a small error can cause significant harm to the patient.^[6] Children are three times more prone to such medication error at each stage of

medicine management process as they have less reserve to buffer error and the difference between therapeutic and toxic dose is less compared to adults.^[7]

The aim of this article is to describe one such medication error which was detected by a child's father that could have been prevented, had there been a proper communication between the doctor and the pharmacist.

An 11-month-old child weighing 8 kg and suffering from high grade fever and running nose was taken to a primary healthcare pediatrician. Based on the symptoms of the child, the diagnosis of common cold was made. The child was therefore prescribed syrup Dolopar125 formulation of acetaminophen (paracetamol), 5 ml 6 hourly, on the first day and then as and when required up to four doses a day. The pharmacist dispensed syrup Dolopar 250 formulation of acetaminophen instead of Dolopar 125. Dolopar 125 contains acetaminophen at a concentration of 125 mg/5 ml while Dolopar 250 contains acetaminophen at a concentration of 250 mg/5 ml. The mother of the child gave the Dolopar 250 formulation in doses as prescribed by the doctor, i.e., 5 ml 6 hourly. The next day, the father of the child by chance read the drug label of Dolopar 250 and calculated that the child is being given acetaminophen at the dose of 31.25 mg/kg 6 hourly compared to 15 mg/kg 3–4 times a day as written on the drug label. He immediately consulted the pediatrician and came to know about the mistake. Till that time the child had been given six doses of acetaminophen, at a dose of 31.25 mg/kg four times a day.

The therapeutic dose of acetaminophen in children is 10–15 mg/kg 6 hourly; the recommended maximum dose of acetaminophen in children is 90 mg/kg/day and acute toxicity is known to occur with >140 mg/kg/day.^[8] Acetaminophen (90%–95%) is mainly metabolized by glucuronide and sulfate conjugation and around 5%–10% is metabolized by cytochrome P-450 enzyme which results in formation of *N*-acetyl-*p*-benzoquinonemine, a highly toxic metabolite. At the therapeutic dose of acetaminophen a small amount of this metabolite is formed which gets detoxified by conjugation with glutathione but with toxic dose of acetaminophen a large amount of toxic metabolite is formed which cannot be detoxified by conjugation with glutathione. The excess amount of this toxic metabolite forms covalent bonding to hepatic and renal cellular proteins causing necrosis and death of cells. Thus inadvertent use of acetaminophen leads to excess formation of *N*-acetyl-*p*-benzoquinonemine; this can cause hepatic injury.^[9] In children <2 years of age a dose of 90 mg/kg/day of acetaminophen for more than 1 day has been found to be a significant risk factor for hepatotoxicity.^[8] Wrong dose of acetaminophen is the most common type of medication error reported in children.^[10] In the present case, the pharmacist

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without confirming from the prescriber dispensed Dolopar250 syrup because of illegibility of prescription. Had father not detected the mistake, acetaminophen at the dose of 125 mg/kg/day would have proved fatal for the child.

Though the dispensing error is the discrepancy between the prescription and the medicine the pharmacist delivers to the patient, the list can be extended by addition of other categories: Failure to detect and correct a prescribing error before dispensing, failure to detect a manufacturing error before dispensing, and failure to provide adequate patient counseling in order to prevent administration error.^[4]

Such a type of medication error can be reduced by computerized physician order entry (CPOE) with clinical decision support systems (CDSSs), computer-aided prescribing, i.e., electronic prescribing.^[6,11] Although computerized prescription systems have been shown to reduce the number of medication errors, because of the high cost of development of these technologies, their implementation will take time especially in the developing countries like India. In addition because CPOE can also create other problems like error in typing, further research is required in this area.^[11] Other strategies that can minimize the incidence of such medication error are as follows:

- (i) The prescriber should^[11,12]
 - (a) Write legibly as this case is showing that even if the prescriber has written correct dose of the drug it was misinterpreted;
 - (b) Mention weight and height of the child as dose in pediatric patients is not fixed. It is calculated from the weight or body surface area of the child and it can be double checked by a pharmacist, nurse, other doctor or by parent if any error is there;
 - (c) Mention the indication for which drug is being prescribed as dose of the same can be different for different indication. It will also decrease error which occurs due to sound/look alike, i.e., azathioprine vs. azithromycin;
 - (d) Avoid usage of abbreviations, symbols, and dose designations which are error prone, i.e., HS can be mistaken for bed-time or half-strength, ug can be misinterpreted as µg or mg, d can be interpreted as mg/kg/day or mg/kg/dose;
 - (e) Try to prescribe generic medicines as this will help in minimizing medication error because of sound/look alike drugs.
- (ii) The pharmacist^[11,12]
 - (a) Should be educated about at risk population, i.e., pediatric and geriatric patients;
 - (b) Should double check the prescription order in these groups of patients; and
 - (c) Should communicate with prescriber in the case of any confusion regarding prescription.

- (iii) In countries like India where data regarding medication error especially in children are lacking, the medication error reporting system should be developed as majority of the medication error go unnoticed. Reporting of these errors will help to prevent medication errors in future.
- (iv) As accurate administration of drug is essential for effective and safe treatment, education of parents/care-takers by drug label, by drug information leaflet, and by better communication with pediatrician will further help to lower medication error.
- (v) Pharmaceutical companies should also take their responsibility in health care:
 - (a) They should pay attention while packing and labeling as much error occurs because of sound/look-alike drugs.^[13]
 - (b) The patient information leaflet should be prepared in such a way that it provides important and adequate information about the concerned drug.
 - (c) Bar coding of the drug package as advised by FDA should be implemented as the bar code scanner will read the code on the drug package and help in identification of the right drug.^[14]
 - (d) In addition, pharmaceutical companies have to be more vigilant while preparing the pediatric formulation as much data is not available from research in pediatric patients and as this case shows that a single strength pediatric formulation would have helped in reducing such type of medication error.

Medication errors in pediatric patients are common but most of the medication errors in pediatric patients can be easily managed by adopting simple strategies. Healthcare providers and parents should be more vigilant about the administration of prescribed medications particularly in the pediatric patients. Regulatory bodies should also encourage the implementation of new technologies and practices which will certainly help in decreasing the medication error.

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