

Medical Errors in Pediatric Practice

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ABSTRACT

This prospective study was conducted in a teaching hospital to identify and analyze medical errors in pediatric practice. All admitted children underwent surveillance for medical errors. Of 457 errors identified in 1286 children, medication errors were 313 (68.5%), those related to treatment procedures were 62 (13.6%) and to clerical procedures 82 (17.9%). Physiological factors accounted for 125 (27.3%) of errors, equipment failures in 68 (14.9%), clerical mistakes 118 (25.8%), carelessness 98 (21.4%) and lack of training for 48 (10.5%). Morbidity was nil in 375 (82%), mild in 49 (10.7%), moderate in 22 (4.8%) and severe in 11 (2.4%) errors.

Keywords: Medical errors, Pediatric practice.

INTRODUCTION

Worldwide there is increasing awareness of the high incidence of medical errors and their significant associated morbidity(1). There is scanty data about medical errors in pediatrics from India. Hence this study was undertaken to calculate incidence of errors, to classify them and to determine the factors that may have led to these errors.

METHODS

This prospective study was conducted between 1st January and 30th June 2005 in a tertiary care teaching hospital. The sample population included all patients admitted in the Neonatal Intensive Care Unit (NICU), Pediatric Intensive Care Unit (PICU), Pediatric ward and rooming-in labor ward of this hospital. Errors were detected by daily chart review and interview of care providers, resident doctors, nurses and clerks in the respective areas. All patients who were detected to have a medical error and confirmed by another post-MD pediatrician were included in this study.

Medical error was defined "as any error in the delivery of medical care, whether it has the potential to cause harm or not"(1). Detailed information of the incident was collected, including patient age, sex,

diagnosis, exact error, time of error, person responsible for the error and outcome of the error. The standard for drug dose and administration was based on either Nelson's Textbook of Pediatrics, 17th edition or Cloherty's Manual of Neonatal Care, 5th edition. Anonymity of both patient and the personnel was maintained for medicolegal reasons. The ethics committee of the hospital cleared the study.

RESULTS

There were 1286 admissions (360 in NICU, 360 in pediatric ward, 240 in PICU and 326 in labor room) during the study period with age range from 28 weeks preterm neonates to 18 years. The total number of errors detected was 457/1286 (35.5%) with 276/360 (76.6%) in NICU, 100/240 (41.7%) in PICU, 71/360 (19.7%) in pediatric ward and 10/326 (3.1%) in labor room admissions. Incidence of errors in intensive care units (NICU and PICU), 62.7% was significantly higher than the incidence in non-intensive areas *i.e.*, pediatric ward and labor ward 11.8%. Types of errors included errors related to medication 313 (68.5%), related to treatment procedures 62 (13.6%) and related to clerical procedures in 82 (17.9%). Systematic classification of errors is given in **Table I** and details of the various types of errors are given in **Table II**.

TABLE I SYSTEMATIC CLASSIFICATION OF MEDICAL ERRORS

Errors related to medication	313 (68.5%)
Misuse of medication	
Incorrect medication	15 (3.3%)
Incorrect route	4 (0.8%)
Incorrect dose	208 (45.5%)
Error in administration	81 (17.7%)
Overuse of medication	0
Underuse of medication	5 (1.1%)
Errors related to treatment procedures	62 (13.6%)
Errors related to clerical procedures	82 (17.9%)

Two hundred and thirty six errors occurred between 8 AM to 8 PM (51.6%) and 221 between 8 PM to 8 AM (48.3%). No clinically significant outcome was noted in 375 (82%), mild morbidity in 49 (10.7%) (e.g., mild tachycardia, mild tachypnea, thrombophlebitis, asymptomatic hypoglycemia, hyperglycemia), moderate morbidity in 22 (4.8%) (e.g., symptomatic hypoglycemia, desaturation, symptomatic hypothermia), and severe morbidity in 11 (2.4%) (2 cases required ICD insertion due to pneumothorax, 4 patients went into CCF, 3 patients had apnea with bradycardia, 1 patient went into DIC and 1 had rebound hyperbilirubinemia). No patient died due to an error. Two hundred and fifty nine (56.6%) errors were committed by doctors of which 148 (32.4%) were by senior residents and 111 (24.3%) by junior residents. Errors could be attributed to nursing staff in 181 (39.6%) and to technicians and other class III and IV workers in 17 (3.7%).

Analysis of underlying reason for errors revealed physiological factors like weight-based dosing of drugs in children in 125 (27.3%), equipment failures or inadequacy in 68 (14.8%), clerical mistakes in 118 (25.8%), carelessness in 98 (21.4%) and a lack of training and experience in 48 (10.5%). Error was considered to be due to lack of training if the person who committed it had less than 1 year training in a pediatric department and carelessness if more than 1 year training had passed.

DISCUSSION

The spectrum of errors is a function of the method of detection. We used daily chart review and interview

TABLE II DETAILS OF ERRORS

	Written	Actually given
<i>Errors related to medication</i>		
Overall higher doses	65	60
Overall lower doses	27	20
Wrong schedule	53	53
mg/mL confusion	22	2
Wrong copy	27	3
Extra doses than required	9	9
Dose not adjusted to creatinine clearance	5	5
Incorrect medication prescribed	5	4
Incorrect medication given without instruction		10
Drugs given through incorrect route		4
Underuse of medication		5
<i>Errors related to administration</i>		
IV fluids given in a shorter duration than scheduled		20
Extra amount of fluids given		4
IV fluids stopped without instruction		12
Different rate of IV infusion		16
Wrong IV fluid		1
Fluid given when IV line was not patent		1
Oxygen continued despite being instructed to stop		8
Errors in vaccination clinic		11
Orders not carried out despite instruction		8
<i>Errors related to treatment procedures</i>		
Exchange transfusion		4
Pneumothorax		2
Hyperthermia		29
(i) Due to phototherapy units		10
(ii) Due to displacement of sensor probes		19
Hypothermia		26
ET tube in esophagus		1
<i>Errors related to clerical procedures</i>		
Wrong weight		5
Similar names		3
Delay in collection of reports		4
Forgot to write the drugs		54
Telephone errors		12
Thrown away the samples		4

WHAT THIS STUDY ADDS?

- Incidence of medical errors in a tertiary care pediatric unit in India was 35.5% and severe morbidity due to errors was seen in 2.4%.

of care providers. Kaushal, *et al.*(2) have successfully used this technique but it is effort intensive. Other techniques include anonymous reporting of errors but since this is voluntary, errors detected are low(3). One adaptation from industry is a real-time random safety audit such as checking all patient identifiers on a day(4).

The large number of errors (62.7%) in intensive care units in our study is comparable to Kaushal, *et al.*(2) from a NICU in the USA where medication errors were reported in a frequency of 91/100 admissions. Weight-based dosing in pediatrics has an error rate of 11-30 %, vis-à-vis non-weight based dosing in adults with an error rate of 6%(5,6). Wrong rates of fluid administration are reported worldwide(3). Errors due to drugs which sound alike such as 0.3% versus 3% saline or Hib versus HepB vaccine have been addressed by others. Special labeling like a "TALL MAN" system can emphasize differences such as cefotaxime and ceftazidime(7). Our study did not show any significant diurnal variation in errors. However in other studies errors were common between 6-10 PM(8,9) due to the impact of sleep deprivation on performance. Severe morbidity as seen in our data (2.4%) has been also reported from round the world (0.7%-6.5%)(10). Besides morbidity, errors increase length of hospital stay, cost of therapy and risk of litigation(11).

Though we tried to identify the person responsible for the error, most researchers believe human fallibility is only a small part of the problem. Errors must be seen as failures of the system if they are to be prevented. In medicine, systems are excessively dependent on the vigilance and reliability of human beings. The "person approach" to error is based on assigning blame, focuses on individual and is punitive in nature. The "systems approach" is based on preventing recurrence of errors by focusing on system vulnerabilities that

allow errors to occur and actions that can be taken to mitigate them(12). Clinical pharmacists, computerized prescriptions, barcode technology, electronic patient records and in-house mortality conferences all help to reduce errors(13-15).

In summary, errors in pediatric practice are rampant especially in the intensive care units. A non-punitive systems analysis approach will help to identify and rectify potential sources of iatrogenic morbidity and mortality in children.

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