Medication Errors at Queen Sirikit National Institute of Child Health

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Abstract

Background : In the past two years, medication errors have been recognized as having been unacceptably high among hospitalized patients.

Objective : To determine the incidence and type of medication errors, severity of events, patient outcomes and categories of drugs involved in the largest pediatric hospital in Thailand over a fifteen-month-period.

Patients and Method : Retrospective review of in-patient medication errors documented in standard reporting forms from September 2001 to November 2002. Main outcome measure was the incidence of errors reported.

Results : Medication errors occurred in 1 per cent of admissions (322 errors of 32,105 admissions). The most common error type was prescription error (35.40%). The majority of errors were detected and prevented before the drugs were administered (76.71%). There was only one case of permanent brain damage; no deaths occurred in the study period. The most common group of drugs involved in medication errors was antibiotics and the most common route of administration was oral.

Conclusion : Medication errors are not uncommon. There is a need to change the behaviors of recognizing and acknowledging clinical errors, including drug errors. Careful review of errors highlights the many opportunities to change how drug errors are addressed and to make them less likely.

Key word : Medication Errors, Queen Sirikit National Institute of Child Health

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Medication errors are important causes of iatrogenic disease in hospitalized patients. While many errors are minor, those associated with morbidity and mortality increase health care costs and can be a source of litigation. Medical malpractice claims may deleteriously affect long-term physician-patient relationships, such as lost trust. The impact of an adverse drug event and subsequent malpractice claims can be emotionally and professionally devastating for physicians[1-4]. Most of the published information documenting the incidence and type of medication errors occurring in patients admitted in hospitals come from North America[1-5]. A medication errors reporting system has been in place at Queen Sirikit National Institute of Child Health for 2 years. During this time, the Hospital Risk Management Committee has reviewed aggregated error data and promulgated a number of changes in an attempt to reduce errors. In the present study, the authors reviewed the incidence and type of errors reported for a 15-month-period.

SUBJECTS AND METHOD

This study reviewed data collected at Queen Sirikit National Institute of Child health (QSNICH), Bangkok. The institute is one of the largest pediatric teaching hospitals in Thailand with 453 inpatient beds including 8 pediatric intensive care and 8 neonatal intensive care beds.

The medication error reporting policy was established at QSNICH in December 2000 with the first report beginning in March 2001. The medication error policy was applied to all patient wards and was mandated for all medical personnel. Reports were collected in standardised forms. All error reports were investigated by the staff of the department. The reports were submitted to the Hospital Risk Management Committee and underwent a rigorous monthly multidisciplinary review. The error report form had been revised several times to classify the type and severity of errors to monitor the situation and immediately prevent further error. The data were presented to all staff and residents. A double check policy was introduced in various modalities. Double checks of drug administration began with intravenous medication, medications with serious adverse reactions and medications for which errors were frequently reported. Handbooks were published for medical personnel.

Errors were classified into categories including type of errors (prescription, order processing, dispensing, administration and patient noncompliance) and class of drugs involved. Severity ranking was based on a numerical scale of 0-6 and reflected patient outcome[6,7] as specified below.

Level 0 : No medication error occurred (potential errors would be classified here).
Level 1 : An error occurred that did not result in patient harm.
Level 2 : An error occurred that resulted in the need for increased patient monitoring but no change in vital signs and no patient harm.
Level 3 : An error occurred that resulted in the need for increased patient monitoring with a change in vital signs but no ultimate patient harm, or any error that resulted in the need for increased laboratory monitoring.
Level 4 : An error occurred that resulted in the need for treatment with another drug or an increased length of stay or that affected patient participation in an investigational drug study.
Level 5 : An error occurred that resulted in permanent patient harm.
Level 6 : An error occurred that resulted in patient death.

In the present study, the authors reviewed all errors reported from September 2001 to November 2002.

Statistical method

Data were summarized using standard descriptive methods. Error rates were calculated using aggregated monthly admission rates.

RESULTS

There were a total of 32,105 hospital admissions from September 2001 to November 2002 with 322 errors reported during this period, giving an overall error rate accounting for 1 per cent of admissions. The incidence varied little over the 15 months (Table 1).

Table 2 lists the types of errors. The most frequent one was prescription error. For the subtype of errors, the wrong dose was the most common.

Fig. 1 shows the details of the error rate in each month. As time went by, the authors found that the prescription and order processing errors decreased. Dispensing errors strikingly increased in October 2002.

Severity classification is shown in Table 3. The majority of errors were detected and prevented before the drugs were administered. No deaths occurred during the study.

Table 1. Incidence of medication errors.

Year	Month	Admissions	Errors	Incidence (%)
2001	September	2,369	23	0.97
	October	2,484	47	1.89
	November	2,288	22	0.96
	December	2,375	21	0.88
2002	January	2,494	27	1.08
	February	2,070	21	1.01
	March	2,235	26	1.16
	April	1,755	23	1.31
	May	1,495	21	1.40
	June	1,969	15	0.76
	July	2,215	18	0.81
	August	2,101	13	0.62
	September	2,121	11	0.52
	October	2,282	24	1.05
	November	1,852	10	0.53
Total		32,105	322	1.00
Mean		2,140.33	21.47	
SD		279.19	8.79	

Table 2. Types of medication errors.

Types	N	%
Prescription error (doctor)	114	35.40
Wrong dose	83	25.78
Wrong choice	12	3.73
Known allergy	2	0.62
Others (frequency, drug Interaction, drug route)	17	5.28
Order processing error	46	14.29
Ward	42	13.04
Pharmacy	4	1.24
Dispensing error (pharmacy)	112	34.78
Administrative error	49	15.22
Wrong time	7	2.17
Omission error	4	1.24
Wrong strength	6	1.86
Unauthorized drug	0	0
Wrong patient	8	2.48
Extra dose	12	3.73
Wrong route	0	0
Wrong dosage form	12	3.73
Patient non-compliance	1	0.31
Total	322	100

For the evaluation of the drug categories and route of administration, 10 errors were excluded because of incomplete data, so the total number of errors was 312. The most common group of drug involved in medication errors was antibiotics and the most common route of error was oral. Categories of the drug and routes of administration involved in the errors are shown in Table 4.

DISCUSSION

In the present study, the authors reviewed the medication errors reported in in-patients at Queen Sirikit National Institute of Child Health during a 15-month-period, from September 2001 to November 2002. The Institute is the largest hospital for children in Thailand and is one of the largest centers for pediatric residency training. The total number of reports was 322 accounting for 1 per cent of admissions. This incidence is higher than that reported by Ross from the United Kingdom[8] (0.15%) but is lower than in the studies of Brennan, Bond and Kaushal from the United States of America (3.7%, 5.07% and 5.7% respectively)[5,9,10]. Fortunately, in the present study 247 (76.71%) errors were intercepted (level 0) and corrected before the drugs were administered.

Prescription error is the most common type of error as in all other reports[2,5,8,10]. The authors believe that the reason is, that in these errors there is definite documented evidence together with a complete double-check system by pharmacists or nurses for every prescription.

Dosing error is the most common subtype of errors as in all other reports[2,8,10,11] because

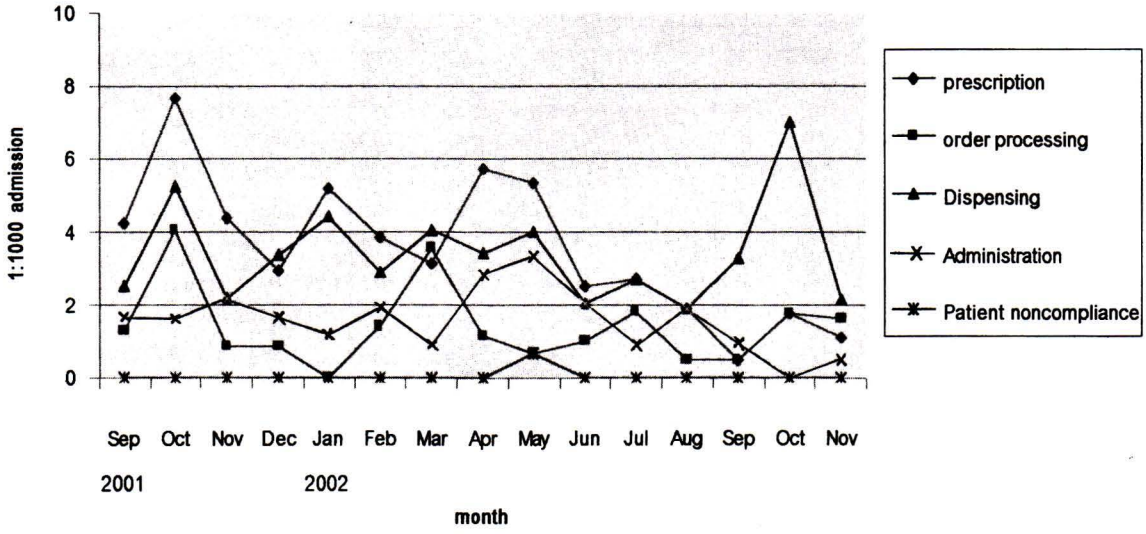

Fig. 1. Frequency of types of errors each month.

Table 3. Severity level.

Level	Errors (N)	%
0	247	76.70
1	47	14.60
2	15	4.66
3	11	3.42
4	1	0.31
5	1	0.31
6	0	0
Total	322	100

pediatric drug prescription requires calculation using weight or body surface area and is prone to human error. The importance of checking calculations and avoiding deciminal point errors where possible has been emphasized.

Prescription and order processing errors decreased significantly with time. The authors believe that this resulted from their intervention.

Dispensing errors which strikingly increased in October 2002 may be explained by the increased number of in-patient admissions while the number of pharmacists decreased during this period.

In the present report most of the errors were detected and prevented before the drugs were administered (level 0). This is consistent with other reports [2,7,8,12] but is much less than that reported by Phillips et al[13]. The only serious adverse effects in the present study occurred on 2 occasions. The first one was the intravenous form of methotrexate administered *via* intrathecal route producing convulsion and permanent patient harm. The second adverse event was a 10 times excessive dosage of intravenous diphenhydrinate producing agitation with the need for treatment. There was no death in the present report. In contrast, Phillips et al[13] reported errors resulting in patient death and which involved administering an improper dose, wrong drug or using the wrong route (40.9, 16 and 9.5%, respectively). Improper placement of the decimal point was the most common error in making calculations in the present study as in the study by Phillips et al[13,14].

The most common drug involved in medication error was antibiotics. This is also consistent with other studies[1,2,8-10,15,16]. The reasons for this may be that they are the most frequent drugs used for in-patients and the variety of antibiotics with similar brand names (e.g. cefotaxime and cefuroxime), with different routes, dosage and frequency of administration. Also, the physicians prescribing these are often pediatric residents in training rather than experienced pediatricians.

Table 4. Drug categories and routes of administration of medical errors.

Drug categories	Number and per cent of errors for each route of administration									
	Total		IV/IM		Oral		Inhalation		Topical	
	N	%	N	%	N	%	N	%	N	%
1. Antibiotics	96	30.77	38	30.4	57	32.76	0	0	1	20
2. Fluid electrolyte & mineral	44	14.10	29	23.2	15	8.62	0	0	0	0
3. Cardiovascular drug	28	8.97	13	10.4	15	8.62	0	0	0	0
4. Gastrointestinal	26	8.33	5	4	21	12.07	0	0	0	0
5. Respiratory	20	6.41	3	2.4	14	8.04	3	37.5	0	0
6. Analgesic + pyretic + inflame	19	6.09	0	0	18	10.34	0	0	1	20
7. CNS	18	5.77	9	7.2	9	5.17	0	0	0	0
Tranquilizer + antidepressant	4	1.28	0	0	4	2.30	0	0	0	0
Hypnotic + sedative	10	3.21	9	7.2	1	0.57	0	0	0	0
Anticonvalsant	4	1.28	0	0	4	2.30	0	0	0	0
8. Corticosteroid + hormone	16	5.13	6	4.8	4	2.30	5	62.5	1	20
9. Antineoplastic	14	4.49	11	8.8	3	1.72	0	0	0	0
10. Vitamin	12	3.85	4	3.2	8	4.60	0	0	0	0
11. Antiparasitic	5	1.60	0	0	4	2.30	0	0	1	20
12. Blood component	2	0.64	2	1.6	0	0	0	0	0	0
13. Others	12	3.85	5	4	6	3.45	0	0	1	20
Total	312	100	125	100	174	100	8	100	5	100

SUMMARY

Medication errors can occur in all stages of patient care. Physicians have to be alert to this fact and help to reduce the incidence and severity of medication errors as much as possible. This can be accomplished by improving the knowledge of medical personnel in a variety of ways. Good communication, using a documented order form instead of verbal ordering, using computerized physician order entry with clinical decision support (e.g. drug-allergy checks, drug-dose checks, drug-drug interaction checks etc), increasing carefulness (during drug calculation, inpatient identification, etc), a good patient/personnel ratio, full-time doctors, ward-based clinical pharmacists and a double-check policy are all important means to reduce medication errors.

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ความผิดพลาดในการให้ยาในสถาบันสุขภาพเด็กแห่งชาติมหาราชินี

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บทนำ : ความผิดพลาดทางยาเป็นอุบัติการณ์ความเสี่ยงที่มีการรายงานมากที่สุดในระยะ 2 ปีที่ผ่านมาในสถาบันสุขภาพเด็กแห่งชาติมหาราชินี

วัตถุประสงค์ : เพื่อศึกษาอุบัติการณ์ ประเภทของความผิดพลาด ระดับความรุนแรงของความผิดพลาดที่เกิดขึ้นกับผู้ป่วย และชนิดของยาที่เกิดความผิดพลาด

ผู้ป่วยและวิธีการศึกษา : เป็นการศึกษาย้อนหลังโดยการทบทวนรายงานอุบัติการณ์ความผิดพลาดทางยาของผู้ป่วยใน และการค้นหาข้อมูลเพิ่มเติมส่วนของรายงานที่ไม่สมบูรณ์ ตั้งแต่เดือนกันยายน 2544 ถึงเดือนพฤศจิกายน 2545

ผลการศึกษา : พบอุบัติการณ์ความผิดพลาดร้อยละ 1 ของผู้ป่วยใน (ความผิดพลาด 322 รายการจากจำนวนผู้ป่วยในทั้งสิ้น 32,105 ราย) ประเภทของความผิดพลาดที่พบมากที่สุดคือ การสั่งจ่ายยาของแพทย์ (ร้อยละ 35.40) ความผิดพลาดส่วนใหญ่ได้รับการตรวจสอบพบและแก้ไขก่อนที่ผู้ป่วยจะได้รับยา (ร้อยละ 76.71) มีผู้ป่วย 1 รายที่เกิดความพิการถาวร ไม่พบผู้ป่วยเสียชีวิต ยาที่เกิดความผิดพลาดมากที่สุดคือยาปฏิชีวนะ และเป็นยาชนิดกินมากที่สุด

สรุป : ความผิดพลาดทางยาเกิดขึ้นได้ไม่ยาก จึงมีความจำเป็นที่จะต้องมีการพัฒนาคุณภาพทั้งด้านความรู้ การเฝ้าระวังและมีการตรวจสอบเรื่องยาของบุคลากรที่เกี่ยวข้องทุกคน

คำสำคัญ : ความผิดพลาดในการให้ยา, สถาบันสุขภาพเด็กแห่งชาติมหาราชินี

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