



# Drug Safety Review

## Pediatric population requires vigilance to ensure safety

**A** data analysis from United States Pharmacopeia's MEDMARX<sup>SM</sup> reporting program in 2003 revealed that nearly 3.6% (291/8,193) of medication errors in the pediatric population (patients less than 17 years old) led to some level of patient harm. Treating pediatric patients requires specialized knowledge and skills and must consider the unique physiological, emotional, and social characteristics of this population subset. Health-care practitioners must pay close attention to a child's age, weight, med-

ication (MER) program in 2003, of which 30% (29/97) were categorized as harmful. The top three most frequently reported Types of Error collected by MER were unauthorized or "wrong drug" errors, improper dose/quantity errors, and prescribing errors.

### Selected pediatric case reports

**Case #1:** A three-year-old girl with seizures was brought to an emergency room while seizing. A physician gave a verbal order for a diaze-

epam 2-mg injection, but lorazepam 2 mg was given instead. Both products were available as floor stock items in the ER, but diazepam was stored in a locked narcotic cabinet and lorazepam was stored in a locked compartment in the ER medication refrigerator. The nurse who took the order

confused the similar-sounding drug names, and when she asked the charge nurse to verify that the correct product was retrieved from floor stock, the charge nurse (who did not hear the verbal order) merely verified that the drug retrieved was lorazepam. The child experienced cardiac arrest but was resuscitated and recovered.

**Case #2:** A patient receiving total parenteral nutrition (TPN) therapy at home was admitted to the hospital. Admission orders were written to

### Types of error

Type of error <sup>1</sup>	Non-harmful errors	Percent	Harmful errors	Percent	Total
Wrong administration technique	147	88.0	20	12.0	167
Wrong route	71	88.8	9	11.3	80
A type not determined	175	88.8	22	11.2	197
Deteriorated product	16	88.9	2	11.1	18
Prescribing error	295	91.6	27	8.4	322
Improper dose/quantity	1,793	94.1	113	5.9	1,906
Wrong drug preparation	447	94.1	28	5.9	475
Unauthorized drug	667	97.8	15	2.2	682
Extra dose	462	97.9	10	2.1	472
Wrong time	975	98.3	17	1.7	992
Omission error	2,584	98.3	45	1.7	2,629
Wrong dosage form	202	99.0	2	1.0	204
Wrong patient	318	99.4	2	0.6	320
Expired product	56	100.0	0	0.0	56
Total	8,208	—	312	—	8,520

<sup>1</sup>Type of Error is a multi-select field. Data are based on 8,193 records representing a total of 8,520 Type of Error selections.

Note: See [www.nccmerp.org](http://www.nccmerp.org) for complete A-I category definitions.

ication dosing frequencies, allergies, and other factors to ensure the safety of medication therapy.

A review of the Error Category Index for errors that reached the patient but were not harmful (categories C and D) and harmful errors (categories E-I) cross-tabulated with Type of Error reveals that seven types of errors exceeded the 3.6% threshold of harm (see table above).

Ninety-seven errors involving pediatric patients were reported to USP's Medication Errors Report-

ing (MER) program in 2003, of which 30% (29/97) were categorized as harmful. The top three most frequently reported Types of Error collected by MER were unauthorized or "wrong drug" errors, improper dose/quantity errors, and prescribing errors.

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continue the patient on TPN, but the amount of calcium to be added to the admixture was written illegibly. A pharmacist accurately interpreted the order and the correct TPN was prepared and administered. The next day the physician resident copied the original poorly written order, and the wrong amount of calcium was added to the solution. The patient required ventilation, cardiopulmonary resuscitation, and oxygen, was transferred to a higher level of care, and later died. A root-cause



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analysis summary revealed the following safety-net failures: (1) An illegible order was copied from the previous day's order sheet; (2) an alert from the pharmacy computer system was overridden because the pharmacist checked the second order against the previous day's illegible order; and (3) the nurse administered the medication because it was checked against the previous day's illegible order.

**Case #3:** A two-year-old boy scheduled for a minor surgical procedure was given a morphine 2-mg injection along with several other preoperative medications. After the procedure, he was transferred to the recovery room. The nurse receiving him did not review the OR report to see what medications had already been given and proceeded to give the 27-lb. boy an additional 2 mg of morphine over a five-minute period. The patient received a total of 4

mg of morphine in less than one hour—twice the recommended amount for his weight. The patient stopped breathing shortly afterward and required resuscitation and a narcotic antagonist to reverse the respiratory depression caused by the morphine. The patient made a full recovery.

Medication errors in the pediatric population result from multiple failures including:

- Miscalculations and misinterpretation of drug dosages
- Inappropriate measuring devices for pediatric patients
- Nonadherence to procedures and protocols
- Nonadherence to double-checking
- Inexperienced and/or insufficient hospital staff
- Inadequate counseling of the patient's caregiver

The vulnerability of the pediatric patient requires extra care during the

process of prescribing, dispensing, transcribing, administering, and monitoring of drug products. In an effort to assist healthcare professionals, consumers, and manufacturers, USP has developed recommendations to avoid errors for medications in the pediatric population: <http://www.usp.org/patientSafety/tools/pedRecommnds2003-01-22.html>.

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USP operates two complementary reporting programs: the Medication Error Reporting Program, presented in cooperation with the Institute for Safe Medication Practices, and MEDMARX. For more information on how to report errors, visit: [www.usp.org/patientsafety](http://www.usp.org/patientsafety).