

An Analysis of Medication Errors in the Emergency Department Setting As Reported to MEDMARXSM (n=3,449) and MER* (n=67)

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BACKGROUND

Medication errors occur in all clinical settings. Since the release of the Institute of Medicine's report in 1999, there has been heightened awareness of the issue. Studies reporting medication errors in the Emergency Department (ED) setting have typically been limited to only one ED. The complexity of care and the fast-paced nature of care add to the nature and incidence of medication errors occurring in the ED setting.

National voluntary medication error reporting data bases, such as USP's MEDMARX and Medication Errors Reporting (MER) Program* provide dynamic means for hospitals to share their experiences and solutions in a nonthreatening manner. MEDMARX is an anonymous, Internet-based medication error reporting program that has been used by more than 700 hospitals and health systems nationwide. MER is a national, voluntary medication error reporting program for use by any person in any clinical setting. Data presented here represents the largest review of ED errors reported from multiple facilities.

* The USP Medication Errors Reporting Program is presented in cooperation with the Institute for Safe Medication Practices and includes data from 1991 through June 30, 2003. USP's MEDMARX program includes data from January 1, 2002, through December 31, 2002.

Methods

Microsoft® Access and Crystal Reports® were used to build queries that identified medication errors occurring in the ED from both MER and MEDMARX. Records matching the location were examined for:

- ▶ Node in the Medication Use Process
- ▶ Error Category
- ▶ Type of Error
- ▶ Cause(s) of Error
- ▶ Contributing Factor(s)
- ▶ Product(s) Involved
- ▶ Error Description

FINDINGS

3,516 records that met the search criteria.

Error Category	Definition	n	%
No Error			
Category A	Circumstances or events that have the capacity to cause error	1	<0.1%
Error, No Harm			
Category B	An error occurred but the error did not reach the patient	938	26.7%
Category C	An error occurred that reached the patient but did not cause patient harm	1,849	52.6%
Category D	An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm	523	14.9%
Error, Harm			
Category E	An error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention	148	4.2%
Category F	An error occurred that may have contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalization	34	1%
Category G	An error occurred that may have contributed to or resulted in permanent patient harm	5	0.1%
Category H	An error occurred that required intervention necessary to sustain life	7	0.2%
Error, Death			
Category I	An error occurred that may have contributed to or resulted in patient's death	11	0.3%

Source: National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP). Percentages may not equal 100% due to rounding.

Cause of Error

Top 20 Causes of Error	n	%
Performance deficit	1,374	40%
Procedure/protocol not followed	654	19%
Communication	566	16.5%
Knowledge deficit	486	14.1%
Documentation	304	8.8%
Calculation error	247	7.2%
Verbal order	211	6.1%
Written order	183	5.3%
Computer entry	172	5%
Transcription inaccurate/omitted	157	4.6%
Dispensing device involved	137	4%
Contraindicated, drug allergy	106	3.1%
Monitoring inadequate/lacking	104	3%
System safeguard(s)	100	2.9%
Dosage form confusion	84	2.4%
Drug distribution system	80	2.3%
Handwriting illegible/unclear	77	2.2%
Pump, improper use	61	1.8%
Similar packaging/labeling	57	1.7%
Preprinted medication order form	52	1.5%

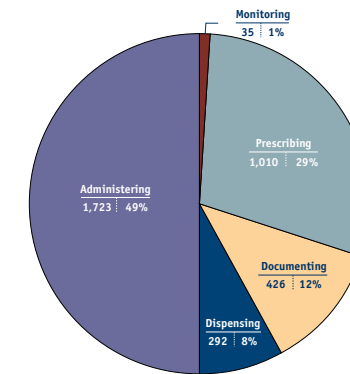
There were 3,438 records associated with 5,880 selections

Type of Error

Error Type	n	%
Improper dose/quantity (Wrong dose)	891	26.9%
Prescribing error	721	21.8%
Omission error	583	17.6%
Unauthorized drug (wrong drug)	410	12.4%
Wrong patient	197	6
Extra dose	177	5.4
Wrong drug preparation	175	5.3
Wrong time	158	4.8
Wrong administration technique	144	4.4
Wrong route	138	4.2
Wrong dosage form	50	1.5

3,308 records were associated with 3,644 Type of Error selections

Node in Medication Use Process (N=3,486)



30 cases in which the Node was either not applicable or not reported

Product(s)* Involved

There were nearly 500 unique products involved in errors. The leading products were:

Generic Name	N	%
Heparin†	227	7.6%
Ceftriaxone	89	3%
Insulin†	86	2.9%
Meperidine†	71	2.4%
Levofloxacin	70	2.4%
Potassium Chloride†	64	2.2%
Azithromycin	63	2.1%
Nitroglycerin	59	2%
Morphine†	57	1.9%
Ibuprofen	53	1.8%
Hydrocodone and Acetaminophen	50	1.7%
Promethazine	49	1.7%
Ketorolac	48	1.6%
Methylprednisolone	48	1.6%
Acetaminophen	45	1.5%
Enoxaparin	45	1.5%
Furosemide	42	1.4%
Cefazolin	38	1.3%
Hydromorphone†	34	1.1%

* All dosage forms and formulations
† High-alert medication

CONCLUSIONS

- ▶ Nearly 6% of the errors resulted in some form of HARM
- ▶ Distractions were the leading contributing factor associated with errors
- ▶ Omission errors were associated with a majority of patient deaths
- ▶ Errors involving Improper dose/quantity (Wrong dose) were seen more often with harmful outcomes than any other Type of Error
- ▶ Verbal orders and Written orders were more likely to be associated with errors in the ED than in other studies by USP
- ▶ Improper dose/quantity (Wrong dose) and Prescribing errors were reported more often in the ED than in other studies by USP