



USP Patient Safety CAPSLink™

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This message has been sent to you as a service of the U.S. Pharmacopeia, Center for the Advancement of Patient Safety (CAPS). USP is a not-for-profit, non-governmental organization that promotes the public health by establishing state-of-the-art standards to ensure the quality of medicines and other health care technologies. CAPS is a component of USP's Patient Safety public health program. The USP Center for the Advancement of Patient Safety was created to encourage medication error reporting, conduct data analysis and research, develop educational programs, and propose standards, recommendations, and guidelines that ultimately improve the safety and quality of patient care.

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USP Medication Error Analysis

Abbreviations are widely used by healthcare practitioners with the intent of facilitating communication and simplifying documentation. However, the use of abbreviations has actually contributed to medication errors – so much so that the Joint Commission has targeted the use of dangerous abbreviations within its 2004 National Patient Safety Goals, and will continue this focus within its 2005 Goals.

A review of records submitted to USP's MEDMARX error reporting program from January, 2000 to August, 2004 found nearly 19,000 error reports from 498 facilities that cited *Abbreviations* as a cause of error. Fortunately, only a very small percentage (0.55%) of these errors were categorized as harmful (Categories E-I) and none were reported as fatal (see Table 1).

Table 1. Error Distribution by Category Index^a

Error Category	Count	Percent
A	7,913	41.6
B	9,169	48.3
C	1,519	8
D	284	1.5
E	73	0.4
F	28	0.15
G	1	0.005
H	2	0.01
I	-	-

a) Based on 498 facilities submitting a total of 18, 989 selections. For a complete description of the Category Index see www.nccmerp.org

Using abbreviations to denote a drug name, dosage, frequency or route of administration affects all aspects of the medication use process - prescribing, transcribing, dispensing, administering, and monitoring. Three **Types of Error** (i.e., *Prescribing*, *Improper dose/quantity*, and *Wrong drug preparation*) made up 93% of all reported errors (Table 2).

Table 2. Distribution of errors by **Type of Error**^a

Type of Error	Count	Percent
Prescribing error	13,462	73
Improper dose/quantity	3,015	16
Wrong drug preparation	708	4
Omission error	525	3
Unauthorized drug	467	3
Wrong time	465	3
Extra dose	332	2
Wrong dosage form	239	1
Wrong route	148	1
Wrong patient	42	0
Wrong administration technique	37	0
Deteriorated product	11	0
Expired product	6	0

a) Based on 494 facilities submitting a total of 19,457 records.

The staff person most often involved with abbreviation-related errors was the physician (Table 3) which corresponds to the previous finding where *Prescribing error* was the most frequently reported **Type of Error**.

Table 3. Staff Most Often Involved when Abbreviations listed as Cause of Error^a

Staff Level	Count	Percent
Physician*	7,341	67

Nurse, Registered**	1,828	17
Pharmacist	635	6
Pharmacy Technician	359	3
Unit Secretary/Clerk	204	2
Physician Assistant	187	2
Nurse Practitioner/Advanced Practice Nurse	109	1
Nurse, Licensed Practical/Vocational	105	1

a) Based on 476 facilities making 11,014 selections. Not all staff levels are listed.

*Includes the selections of physician, physician intern, physician resident.

** Includes the selections of Registered nurse, travel nurse, and graduate nurse.

Selected Cases Reported to USP's MEDMARX and Medication Errors Reporting (MER) Programs:

Case #1: Heparin 800 units/hour was ordered, but the physician used the abbreviation "u" for units. The "u" was misread as another zero (0) and the patient received a ten-fold overdose (i.e., 8,000 units/hour) for approximately four hours. The patient's partial thromboplastin time (PTT) was greater than 240 seconds (normal 22-37 seconds). The antidote protamine sulfate 50 mg was administered once followed by two 10 mg doses. Additional laboratory tests were run, the drug therapy was changed, observation of the patient increased, and monitoring of vital signs was increased. The patient recovered without any lasting harm.

Case #2: A physician wrote an order for "5 ASA suppository" one gr bid. The physician was treating the patient for ulcerative proctitis and intended for the patient to receive mesalamine (sometimes abbreviated as 5-aminosalicylic acid). Pharmacy staff inadvertently entered the order into the computer system as 5 grain aspirin suppository twice a day and the patient received the aspirin suppository, twice a day for eleven days before the error was discovered. The patient's hospitalization was extended and the drug therapy regimen changed.

Case #3: A physician performing a procedure in the cardiac catheterization lab gave a verbal order for "40 of K". The order was relayed by staff in the catheterization lab to a nurse in the critical care unit. The critical care unit nurse transcribed the order as "Vitamin K 40 mg IVP now" and retrieved vitamin K from the automated drug dispensing cabinet. Vitamin K 40 mg was administered IV push to the patient. The physician had intended that the patient receive 40 mEq of Potassium Chloride and not 40 mg of Vitamin K. The patient's international normalized ratio (INR) was sub-therapeutic for 3 days, the warfarin dosage was increased from 2.5 mg to 5 mg, and the dosage of potassium chloride IV was increased. Vitamin K was subsequently removed from the list of drugs that could be accessed from automated cabinets without prior pharmacy review of the physician's order.

Case #4: Magnesium sulfate was ordered as "MgSO₄ 2 Gm IV" for a patient who presented to the hospital's emergency department with respiratory failure. A nurse misinterpreted the order as morphine sulfate 2mg and administered the incorrect product to the patient. The patient became somnolent and the narcotic

reversal agent Narcan ® was administered. The patient fully recovered.

Case #5: A patient presented to the emergency department with red, watery eyes, an ear ache, cough, sore throat, and chest congestion. The physician ordered "auralgan 2 gtts AD" to treat the patient's ear ache. A licensed practical nurse misinterpreted AD (right ear) as OD (right eye) and incorrectly applied this medication to the patient's eye. The patient experienced an immediate burning pain and her eye was immediately flushed. No lasting harm was noted.

Suggestions to Improve Errors Involving Abbreviations

- Review the facility's incident/error reporting program and ensure that it contains indicators that will appropriately track errors that are specifically related to the use of abbreviations.
- A large proportion of errors associated with abbreviations occur in the prescribing phase of the medication use process and *Prescribing error* was the leading **Type of Error**. Facilities should engage medical staff leaders, nursing managers, and pharmacy staff in identifying the most problematic abbreviations and develop a "do not use" list (a requirement of JCAHO National Patient Safety Goals). Compliance with any new policy surrounding problem abbreviations should be monitored by a designated department and person (e.g., quality improvement/JCAHO survey coordinator or pharmacy). Reports of policy compliance should reach both medical staff leaders and senior administration officials within the facility.
- While illegible handwriting is frequently associated with the misinterpretation of abbreviations, the use of abbreviations within computer entry systems can also lead to error. Examine the screen displays of information systems and determine potential and actual problematic drug product names, dosages, dosing frequencies, or routes of administration. Implement changes in the computer software and screen appearance to address identified problems.
- Examine abbreviations that may be used in the screen displays of automated drug dispensing cabinets. Many of the software programs used in these devices use an "auto-fill" or mnemonics style of drug name display that may cause the health care practitioner to inadvertently select, access, dispense, and then administer the wrong product or wrong strength.
- Conduct regular staff seminars for medical, nursing, and pharmacy staff on the potential for misinterpretation whenever a new drug product is added to the facility's formulary.

In July, USP published a list of nearly 200 potentially dangerous abbreviations based on data submitted to both the MEDMARX and MER programs. This list can be used by healthcare professionals to increase their awareness of the many ways in which abbreviations can lead to medication errors. (See: <http://www.usp.org/patientSafety/briefsArticlesReports/qualityReview/qr802004-07-01.html>)

Comparing common prescribing practices and the facility's formulary against this list can help healthcare organizations better understand and, hopefully, address the problems associated with the use of abbreviations in the delivery of health care.

1. JCAHO Updates

JCAHO to Convene National Summit on Abbreviations: On November 23, 2004 the Joint Commission will convene leading physician, nursing, pharmacist, administrator and academic research organizations to address the problems associated with medical abbreviations and discuss the need for a universal "do not use" list. The intended end-product of this initiative would be a consensus list of certain abbreviations not to be used in health care organizations.

http://www.jcaho.org/About+Us/News+Letters/JCAHOnline/jo_08_04.htm#nsma

Joint Commission Resources and USP Offer Workshops on Medication Errors: Back by Popular Demand - There are only three remaining, one-day workshops titled - "Transforming Medication Error Data into Meaningful Information". This interactive program will be offered on the following dates in **2004**:

- **September 22 in Rockville, MD (at USP Headquarters)**
- **November 1 in Oakbrook Terrace, IL (at JCAHO Headquarters)**
- **December 4 in Orlando, FL (Preceding the ASHP meeting)**

The program is designed for nurses, pharmacists, risk managers, medication/patient safety officers, physicians, and quality improvement staff and will teach participants methods to categorize error events by severity, determine thresholds to signal performance problems, and evaluate the impact of actions taken. For more information and to register call- JCR Customer Service toll free at 877-223-6866 or go on-line at <http://www.jcrinc.com/education.asp?durki=7032&site=5&return=5933>

2. Study Examines Physician Overrides of CPOE Allergy Alerts

According to a study in the *Journal of the American Medical Informatics Association*, 80% of the alerts generated by computerized physician order entry systems are overridden, but few of these overrides (about 6%) result in adverse drug events (ADEs). The study, conducted at Brigham and Women's Hospital in Boston, found that those overrides that did lead to ADEs were clinically justifiable. <http://www.jamia.org/cgi/content/abstract/M1556v1>

3.CPOE Changes Ordering Behavior of Physicians: Reduces Test Orders

According to a study published in the *Annals of Internal Medicine*, computerized physician order entry systems (CPOEs) can be used as a tool to improve provider test-ordering behavior and help hospitals reduce test-related expenses. The goal of the study was to reduce costly or duplicate testing without preventing clinicians from ordering desired tests. <http://www.annals.org/cgi/content/full/141/3/196>

4. Commonwealth Fund Studies Barriers to CPOE

Senior managers of 26 hospitals were surveyed to identify the major obstacles to implementing a computerized prescriber-order-entry (CPOE) system. Strategies for overcoming three common barriers (physician and organizational resistance,

CPOE's high cost, and product immaturity) were also examined.
http://www.cmwf.org/publications/publications_show.htm?doc_id=233607

5. New USP Resource on Medication Safety

USP has recently developed a comprehensive, user-friendly medication safety toolkit available on CD-ROM that provides teaching and training tools to effectively report, analyze, and prevent medication errors. [*Understanding and Preventing Medication Errors: A Resource for Healthcare Practitioners*](#) CD includes ready-to-use forms, reports, an action-impact scoring grid, and a customizable slide presentation with scripted talking points on medication error data collection and analysis—all of which an organization can adapt for its own use. The toolkit will help practitioners to

- Report, categorize, and analyze medication error data;
- Understand and target problem-prone areas like dangerous abbreviations; similar drug names; look-alike labeling and packaging; errors in orders, calculations, and technology;
- Practice categorizing errors using case examples and the National Coordinating Council for Medication Error Reporting and Prevention error category index; and
- Implement recommendations and tips from USP's experts on medication safety issues for specific patient populations, hospital locations, and drug product types.

The toolkit also contains the MEDMARX annual data summary reports for 2001 and 2002 covering national error trends and causes. For more information see: [*Understanding and Preventing Medication Errors: A Resource for Healthcare Practitioners*](#)

6. FDA Updates

Alerts Practitioners of Tracheostomy Tube Recall: In July, the FDA and Nellcor/Tyco notified healthcare professionals of a Class I recall of the Shiley Tracheosoft XLT Extended Length Tracheostomy Tube and Cannula. The recall was prompted by reports of separation of the outer cannula from the hub and neck flange allowing the outer cannula to travel farther into the patient's airway leading to airway obstruction. Read the MedWatch 2004 safety summary, including a link to the FDA recall
<http://www.fda.gov/medwatch/SAFETY/2004/safety04.htm#Shiley>

Comments sought on guidance to improve hospital bed safety: The FDA is drafting guidelines on hospital bed systems that are intended to reduce life-threatening entrapments with such systems. The guidance can help hospitals and other health care providers identify entrapment risks that may exist with current bed systems. Comments must be submitted by Nov. 29.
<http://www.fda.gov/cdrh/ocer/guidance/1537.html>



MEDMARXSM—USP's comprehensive, Internet-accessible, anonymous medication errors reporting program, and quality improvement tool. The program facilitates productive and efficient documentation, tracking, trending, and prevention of medication errors.



Medication Errors Reporting (MER) Program—presented in cooperation with the Institute for Safe Medication Practices, this nationwide program makes it possible for health professionals to report medication errors confidentially and anonymously to USP.

Other USP patient safety resources:

- [MEDMARX Annual Data Summary reports](#)—provides readers with a wealth of information on reported error events including patterns in the types, causes, and level of harm associated with medication errors.
- [Understanding and Preventing Medication Errors: A Resource for Healthcare Practitioners](#)—a CD toolkit with practical guidelines, forms, and templates to help healthcare facilities improve error-reduction initiatives.
- [Advancing Patient Safety in U.S. Hospitals: Basic Strategies for Success](#)—a book in which hospitals share stories about how they reduced medication errors and promoted safer patient care.

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