



## Error risks associated with computer order entry

*Editor's note: Welcome to the first installment of a monthly column called USP Drug Safety Review. As the name denotes, this column is based on data derived from the U.S. Pharmacopeia's MEDMARX drug error reporting program.*

Computerized order entry has the potential to reduce and even eliminate a high percentage of medication errors that occur in the prescribing stage. But, like any new technology, it's fraught with pitfalls of its own. When implementing any type of computerized order entry system, healthcare professionals and health-system administrators need to develop a thoughtful, well-planned strategy designed to reduce the risks associated with such systems.

According to USP's Center for the Advancement of Patient Safety, computer entry was the fifth-leading cause of errors reported to USP's MEDMARX in 2000 and 2001. Nearly 10% of all MEDMARX records from September 1998 through December 2002 documented computer entry as a cause of error. Of those, 2% indicated the patient was harmed. In 2001, computer entry was listed as a cause in 11% of all reports where an error occurred.

The most frequently reported types of error associated with computer entry were improper dose/quantity; omission error (failure to administer); and prescribing error (related to drug-drug/drug-food allergies, patient's condition, or an incomplete order).

Based on reports submitted to MEDMARX, there seem to be several common unwanted effects associated with computer entry of orders:

- Dosing errors
  - Look-alike strengths in close proximity on screen (e.g., 40,000 versus 4,000 units/mL)
  - Multiple and differing sliding scales (e.g., potassium, insulin)

-Inadequate dosing algorithms or adjustments for renal failure

- Wrong-drug errors
  - Numerous similar drug names within a drug class (e.g., insulins)
  - Incorrect drug selected for patient's condition or current drug therapy regimen

- Wrong-patient errors
  - Incorrect patient selected from screen due to distractions or patients with similar names on same nursing unit (e.g., Smith, Ron versus Smith, Robert) or similar names within an outpatient pharmacy computer information system.

Here's an example involving a computer-entry error based on an actual MEDMARX report.

**Case:** Category B\*—an error occurred but was intercepted before reaching the patient.

An order was written by a prescriber for Epoetin 4,000 units. All product strengths appeared in close proximity on the computer screen and without any commas to delineate numerical values. Upon entering the order into the computer system, the pharmacist selected the wrong product strength from the on-screen list, choosing "40000u/mL." A label for the product was generated in another area of the pharmacy (away from where the order was entered into the computer), and a second pharmacist (who did not see the original order) dispensed a 40,000 unit/mL vial of Epoetin. A nurse administered the correct dose by withdrawing only 0.1 mL (4,000 units) from the vial and notified pharmacy of the mistake.

**Recommendations:** The USP Center for the Advancement of Patient Safety offers healthcare practitioners the following general recommendations to help reduce the potential for

errors associated with computer entry activities (including CPOE):

- Conduct a Failure Mode and Effects Analysis (FMEA) on the use of computers in the various stages of the medication use process to identify potentially confusing abbreviations, dose designations, dosage forms, drug names, and other problems that may be unique to the use of computers to convey information.
- Standardize and simplify all dosing protocols, including sliding scales, to the extent possible prior to implementing CPOE. Take into account complex or unique drug orders (e.g., "hold 4 P.M. dose until... steroid tapers)
- Use USP standard abbreviations for dosage units to express weights and measures in a standard manner as follows:
  1. m (lower case) = meter
  2. kg = kilogram
  3. g = gram
  4. mg = milligram
  5. mcg = microgram (do not use the Greek letter mu which has been misread as mg)
  6. L (upper case) = liter
  7. mL (lower/upper case) = milliliter (do not use cc which has been misread as U or the number 4)
  8. mEq = milliequivalent
  9. mmol = millimole
- Establish the proper balance between sensitivity and specificity for computer warnings/alerts to reduce practitioners from "false-alarm" fatigue leading to frequent overrides of the warnings.
- Interface CPOE with the MAR as well as pharmacy and laboratory computer systems to maximize the exchange of accurate and up-to-date patient information.

\*For a complete category listing (A-I), with definitions, see [www.ncmerp.org](http://www.ncmerp.org).

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