

Recommendations from the National Coordinating Council for Medication Error Reporting and Prevention

Recommendations to Correct Error-Prone Aspects of Prescription Writing

The National Coordinating Council for Medication Error Reporting and Prevention emphasizes that illegibility of prescriptions and medication orders has resulted in injuries to, or deaths of patients. The Council, therefore, has made the following recommendations to help minimize errors.

- **All prescription documents must be legible. Prescribers should move to a direct, computerized, order entry system.**
- **Prescription orders should include a brief notation of purpose (e.g., for cough), unless considered inappropriate by the prescriber.** Notation of purpose can help further assure that the proper medication is dispensed and creates an extra safety check in the process of prescribing and dispensing a medication. The Council does recognize, however, that certain medications and disease states may warrant maintaining confidentiality.
- **All prescription orders should be written in the metric system except for therapies that use standard units such as insulin, vitamins, etc.** Units should be spelled out rather than writing “U.” The change to the use of the metric system from the archaic apothecary and avoirdupois systems will help avoid misinterpretations of these abbreviations and symbols, and miscalculations when converting to metric, which is used in product labeling and package inserts.
- **Prescribers should include age, and when appropriate, weight of the patient on the prescription or medication order.** The most common errors in dosage result in pediatric and geriatric populations in which low body weight is common. The age (and weight) of a patient can help dispensing health care professionals in their double check of the appropriate drug and dose.
- **The medication order should include drug name, exact metric weight or concentration, and dosage form.** Strength should be expressed in metric amounts and concentration should be specified. Each order for a medication should be complete. The pharmacist should check with the prescriber if any information is missing or questionable.
- **A leading zero should always precede a decimal expression of less than one.** A terminal or trailing zero should never be used after a decimal. Ten-fold errors in drug strength and dosage have occurred with decimals due to the use of a trailing zero or the absence of a leading zero.
- **Prescribers should avoid use of abbreviations including those for drug names (e.g., MOM, HCTZ) and Latin directions for use.** The abbreviations in the chart below are found to be particularly dangerous because they have been consistently misunderstood and therefore, should never be used. The Council reviewed the uses for many abbreviations and determined that any attempt at standardization of abbreviations would not adequately address the problems of illegibility and misuse.
- **Prescribers should not use vague instructions such as “Take as directed” or “Take/Use as needed” as the sole direction for use.** Specific directions to the patient are useful to help reinforce proper medication use, particularly if therapy is to be interrupted for a time. Clear directions are a necessity for the dispenser to: (1) check the proper dose for the patient; and, (2) enable effective patient counseling.

Dangerous Abbreviations

Abbreviation	Intended Meaning	Common Error
U	Units	Mistaken as a zero or a four (4) resulting in overdose. Also mistaken for “cc” (cubic centimeters) when poorly written.
µg	Micrograms	Mistaken for “mg” (milligrams) resulting in a ten-fold overdose.
Q.D.	Latin abbreviation for every day	The period after the “Q” has sometimes been mistaken for an “I,” and the drug has been given “QID” (four times daily) rather than daily.
Q.O.D.	Latin abbreviation for every other day	Misinterpreted as “QD” (daily) or “QID” (four times daily). If the “O” is poorly written, it looks like a period or “I.”
SC or SQ	Subcutaneous	Mistaken as “SL” (sublingual) when poorly written.
T I W	Three times a week	Misinterpreted as “three times a day” or “twice a week.”
D/C	Discharge; also discontinue	Patient’s medications have been prematurely discontinued when D/C, (intended to mean “discharge”) was misinterpreted as “discontinue,” because it was followed by a list of drugs.
HS	Half strength	Misinterpreted as the Latin abbreviation “HS” (hour of sleep).
cc	Cubic centimeters	Mistaken as “U” (units) when poorly written.
AU, AS, AD	Latin abbreviation for both ears; left ear; right ear	Misinterpreted as the Latin abbreviation “OU” (both eyes); “OS” (left eye); “OD” (right eye)

In summary, the Council recommends:

Don't Wait ... Automate!
When In Doubt, Write It Out!
When In Doubt, Check It Out!
Lead, Don't Trail!

Recommendations on Labeling and Packaging to Industry (Manufacturers of Pharmaceuticals and Devices)

The Council recommends that industry not use any printing on the cap and ferrule of injectables except to convey warnings.

The Council encourages industry to employ failure mode and effects analysis in its design of devices, and the packaging and labeling of medications and related devices.

The Council encourages industry to employ machine-readable coding (e.g. bar coding) in its labeling of drug products. The Council recognizes the importance of standardization of these codes for this use.

The Council encourages printing the drug name (brand and generic) and the strength on both sides of injectables, and IV bags, containers, and overwraps. For large volume parenterals and IV piggybacks (minibags), the name of the drug should be readable in both the upright and inverted positions.

The Council encourages industry to support the development of continuing education programs focusing on proper preparation and administration of its products.

The Council encourages industry to use innovative labeling to aid practitioners in distinguishing between products with very similar names, for example, the use of tall letters such as VinBLAS^tine and VinCRIS^tine.

The Council encourages industry to avoid printing company logos and company names that are larger than the type size of the drug name.

The Council encourages collaboration among industry, regulators, standards-setters, health care professionals, and patients to facilitate design of packaging and labeling to help minimize errors.

Adopted May 12, 1997 by the National Coordinating Council for Medication Error Reporting and Prevention.

Recommendations on Labeling and Packaging to Regulators and Standards-Setters

The Council recommends that FDA restrict the use of any printing on the cap and ferrule of injectables except to convey warnings.

The Council recommends the use of innovative labeling to aid practitioners in distinguishing between products with very similar names, for example, the use of tall letters such as VinBLAS^tine and VinCRIS^tine.

The Council recommends that FDA discourage industry from printing company logos and company names that are larger than the type size of the drug name.

The Council supports the recommendations of the USP-FDA Advisory Panel on Simplification of Injection Labeling.

Furthermore, the Council encourages USP/FDA to consider expansion of the concepts of simplification to apply to:

- Package inserts
- Labeling of other pharmaceutical dosage forms

The Council encourages further development of FDA's error prevention analysis efforts to provide consistent regulatory review of product labeling and packaging relative to the error-prone aspects of their design.

The Council encourages collaboration among regulators, standards-setters, industry, health care professionals, and patients to facilitate design of packaging and labeling to help minimize errors.

The Council encourages USP/FDA to examine feasibility and advisability of use of tactile cues in container design and on critical drugs. Such cues may be in the design of the container or embedded in the label.

The Council encourages the printing of the drug name (brand and generic) and the strength on both sides of injectables and IV bags, containers, and overwraps. For large volume parenterals and IV piggybacks (minibags), the name of the drug should be readable in both the upright and inverted positions.

Adopted May 12, 1997 by the National Coordinating Council for Medication Error Reporting and Prevention.

Recommendations to Health Care Organizations to Reduce Errors Due to Labeling and Packaging of Drug Products and Related Devices

The Council recommends the establishment of a systems approach to reporting, understanding, and prevention of medication errors in health care organizations. The organization's leaders should foster a culture and systems that include the following key elements:

- a. An environment that is conducive to medication error reporting through the FDA MedWatch Program and/or the USP Practitioners' Reporting Network.
- b. An environment which focuses on improvement of the medication use process.
- c. Mechanisms for internal reporting of actual and potential errors including strategies that encourage reporting.
- d. Systematic approaches within the health care organization to identify and evaluate actual and potential causes of errors including Failure Mode and Effects Analysis (FMEA)¹ and root cause analysis.
- e. Processes for taking appropriate action to prevent future errors through improving both systems and individual performance.

In addition, the Council makes the following recommendations to health care organizations to reduce errors due to labeling and packaging of drug products and related devices:

1. The Council recommends that health care organizations employ machine readable coding (e.g., bar coding) in the management of the medication use process.

2. The Council recommends reevaluation of existing storage systems for pharmaceuticals by health care organizations and establishment of mechanisms to insure appropriate storage and location throughout the organization from bulk delivery to point of use. The following issues should be considered when applicable:
 - Storage and location that will help distinguish similar products from one another
 - Storage and location of certain drugs, (e.g., concentrates, paralyzing agents) that have a high risk potential
 - Scope, access, and accountability for floor stock medications
 - Safety and accountability of access to pharmaceuticals in the absence of a pharmacist (e.g., floor stock, eliminate access to pharmacy after hours)
 - Labeling and packaging of patient-supplied medications.
 3. The Council recommends the development of policies and procedures for repackaging of medications that will clarify labeling to help avoid errors.
 4. The Council encourages collaboration among health care organizations, health care professionals, patients, industry, standard-setters, and regulators to facilitate design of packaging and labeling to help minimize errors.
 5. The Council recommends that health care organizations develop and implement (or provide access to) education and training programs for health care professionals, technical support personnel, patients, and caregivers that address methods for reducing and preventing medication errors.
3. The Council encourages health care professionals to take an active role in reviewing and commenting on proposed regulations and standards that relate to labeling and packaging (i.e., *Federal Register* and *Pharmaceutical Forum*).
 4. The Council encourages health care professionals to report actual and potential medication errors to national (e.g., FDA MedWatch Program and/or the USP Practitioners' Reporting Network), internal, and local reporting programs.
 5. The Council encourages health care professionals to share error-related experiences, case studies, etc., with their colleagues through newsletters, journals, bulletin boards, and the Internet.

Adopted March 30, 1998 by the National Coordinating Council for Medication Error Reporting and Prevention.

Recommendations to Reduce Errors Related to Administration of Drugs

Adopted June 29, 1999

1. The Council recommends that any order that is incomplete, illegible, or of any other concern should be clarified prior to administration using an established process for resolving questions.
2. The Council recommends that as one aspect of the overall medication use system, the following checks be performed immediately prior to medication administration: the right medication, in the right dose, to the right person, by the right route, at the right time.
3. The Council recommends that users of medication administration devices be knowledgeable about the device function and limitations.
4. The Council recommends that when electronic infusion control devices are employed, only those that prevent free-flow upon removal of the administration set should be used.
5. The Council encourages the use of linked automated systems (e.g., direct order entry, computerized medication administration record, bar coding) to facilitate review of prescriptions, increase the accuracy of administration, and reduce transcription errors.
6. The Council recommends that all persons who administer medications have adequate access to patient information, as close to the point of use as possible, including medical history, known allergies, prognosis, and treatment plan, to assess the appropriateness of administering the medication.
7. The Council recommends that all persons who administer medications have easily accessible product information as close to the point of use as possible, and are:
 - Knowledgeable about indications for use of the medication as well as precautions and contraindications;
 - Knowledgeable of the expected outcome from its use;
 - Knowledgeable about potential adverse reactions and interactions with food or other medication;
 - Knowledgeable of actions to take when adverse reactions or interactions occur; and,
 - Knowledgeable about storage requirements.

Adopted March 30, 1998 by the National Coordinating Council for Medication Error Reporting and Prevention.

Recommendations to Health Care Professionals to Reduce Errors Due to Labeling and Packaging of Drug Products and Related Devices

The Council encourages health care professionals to routinely educate patients and caregivers to enhance understanding and proper use of their medications and related devices. Furthermore, the Council encourages health care professionals to regularly participate in error prevention training programs and, when medication errors do occur, to actively participate in the investigation.

In addition, the Council makes the following recommendations to health care professionals to reduce errors due to labeling and packaging of drug products and related devices:

1. The Council encourages health care professionals to use only properly labeled and stored drug products and to read labels carefully (at least three times—before, during, and after use).
2. The Council encourages collaboration among health care professionals, health care organizations, patients, industry, standard-setters, and regulators to facilitate design of packaging and labeling to help minimize errors.

8. The Council recommends that health care professionals administer only medications that are properly labeled and that during the administration process, labels be read three times: when reaching for or preparing the medication, immediately prior to administering the medication, and when discarding the container or replacing it into its storage location.
 9. The Council recommends that at the time of administration, the name, purpose and effects of the medication be discussed with the patient and/or caregiver.
 10. The Council recommends ongoing patient monitoring for desired and/or unexpected medication effects.
 11. The Council recommends that the role of the work environment be considered when assessing safety of the drug administration process. Factors such as lighting, temperature control, noise-level, occurrence of distractions (e.g., telephone and personal interruptions, performance of unrelated tasks, etc.) should be examined. Sufficient resources must be provided for the given workload. The science of ergonomics (use dictionary definition) should be employed in the design of safe systems.
 12. The Council recommends that data be collected regarding the actual and potential errors of administration for the purpose of continuous quality improvement.
3. The Council recommends design of the dispensing area to prevent errors. Design should address fatigue-reducing environmental conditions (e.g., lighting, air conditioning, noise level, ergonomic fixtures); minimize distractions (e.g., telephone and personnel interruptions, clutter, unrelated tasks); and provide sufficient resources for workload.
 4. The Council recommends that product inventory be arranged to help differentiate medications from one another. This may include the use of visual discriminators such as signs or markers. This is particularly important when confusion exists between or among strengths, similar looking labels, and similar sounding names.
 5. The Council recommends that a series of checks be established to assess the accuracy of the dispensing process prior to the medication being provided to the patient. Whenever possible, an independent check by a second individual should be used. Other methods of checking include the use of automation, computer systems, and patient profiles.
 6. The Council recommends that labels be read at least three times, for example, when selecting the product, when packaging the product, and when returning the product to the shelf.
 7. The Council recommends that pharmacists counsel patients. Counseling should be viewed as an opportunity to verify the accuracy of dispensing and the patient's understanding of proper medication use.
 8. The Council recommends that pharmacies collect data regarding actual and potential errors for the purpose of continuous quality improvement.

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Recommendations for Avoiding Error-Prone Aspects of Dispensing Medications

1. The Council recommends that prescriptions/orders always be reviewed by a pharmacist prior to dispensing. Any orders that are incomplete, illegible, or of any other concern should be clarified using an established process for resolving questions.
2. The Council recommends that patient profiles be current and contain adequate information that allows the pharmacist to assess the appropriateness of a prescription/order.

¹Lieberman, P. Design failure mode and effects analysis and the industry. *Automotive Engineering (AUTE)*. 1990; 31.

Approved by the National Coordinating Council for Medication Error Reporting and Prevention, March 19, 1999.

This document was endorsed by the ASHP Board of Directors in November 1999. That endorsement was reviewed in 2005 by the Council on Professional Affairs and by the Board of Directors and was found to still be appropriate.