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Institute for Safe Medication Practices
An ECRI Affiliate

Global Progress in Patient Safety and Prevention of Harmful Medication Errors

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A History of Errors

hospital pharmacy, vol. 10, no. 3, 1975

Medication error reports

Compiled by Michael R. Cohen, Assistant Editor

Error 1

An order was written, "4 U Lente Insulin." Because of poor handwriting, the U was mistaken for an "0." The patient received 40 units of Lente Insulin.

The abbreviation "U" should not be used; the word units should be spelled out.

...he Shows No Rules Viol...

...See editorial, "Stricter Reporting by Hospitals," Page 6A.

...63, never woke up after being given 200 units of insulin April 16, instead of 20 units prescribed by his physician, Dr. A.H. Arazan.

Orr died eight days later in Madison Hospital, where he had been transferred April 17 because the critical care unit at Williamson County Hospital was full.

Arazan had prescribed "5 U reg insulin" — five units of insulin per hour for four hours intravenously — for Orry, a kidney dialysis patient who suffered high potassium levels.

The unidentified Williamson County Hospital nurse apparently misread the orders and gave the patient 50 units per hour instead of five, Caran said.

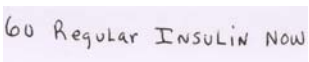
"The way the order was written, could have easily been mistaken as to be 50 rather than five," Brown said yesterday.

But his board, he said, will not take any disciplinary action against the nurse or the doctor.

"We regulate hospitals, not professional staff," Brown said.

He joined Dr. Gladys Williams and registered nurse Elizabeth Skillington in the two-day Williamson County investigation which ended yesterday.

No written rules — either statewide or for the hospital — were vio...



100U Even typed can look like a zero

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Overdose death of cancer patient rocks Mass. hospital

By LAWRENCE K. ALTMAN
Of The New York Times

Two patients receiving experimental treatment for advanced breast cancer at one of the country's most prestigious cancer hospitals were given massive overdoses of two chemotherapy drugs. One patient died, and the other received permanent heart damage.

The incidents occurred late last fall at Dana-Farber Cancer Institute in Boston, a Harvard

The patient who died was Betsy A. Lehman, an award-winning health columnist for the Boston Globe. The news of the mishap, detailed yesterday in an article published in the Globe, was all the more unsettling because Lehman, as a health reporter, was presumably knowledgeable about her treatment and would have chosen her hospital with care. Lehman, who was 39, died on Dec. 3 at the hospital.

Doctors apparently refused to

Betsy Lehman
. . . died Dec. 3

A pathologist who did an autopsy did not spot the overdose. He also found no visible signs of cancer in her body.

The other patient was a 52-

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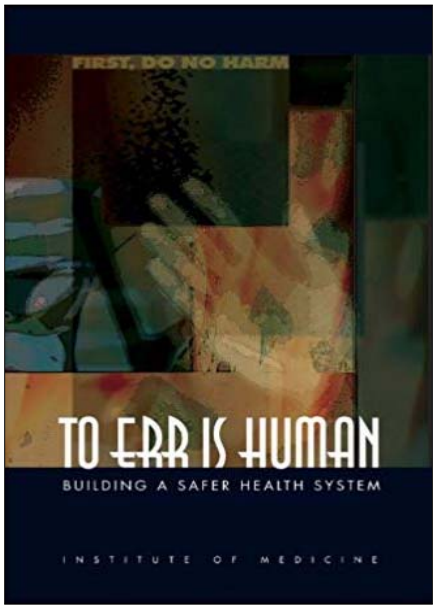

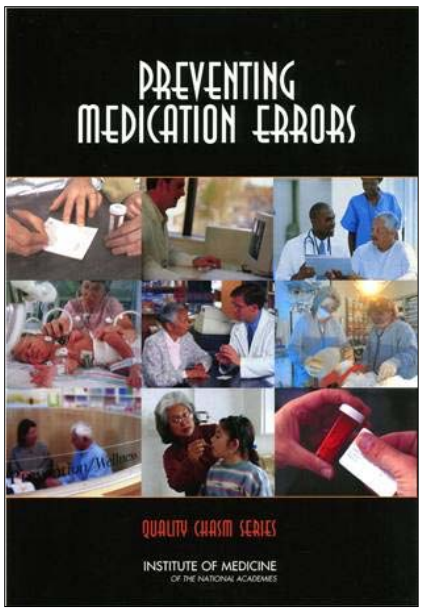

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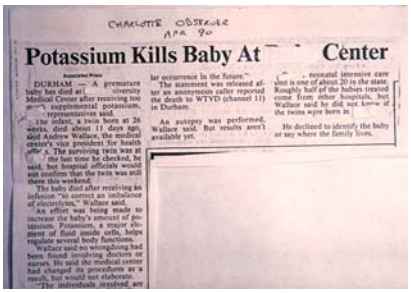
Potassium chloride concentrate

- USP container label requirements
  - **Nomenclature includes "for injection concentrate"**
- Storage of concentrated electrolytes in clinical areas not permitted by Joint Commission



CHARLOTTE OBSERVER
APR 90

Potassium Kills Baby At Center

DURHAM — A premature baby has died at iversity Medical Center after receiving too supplemental potassium, representatives said.

The infant, a twin born at 26 weeks, died about 11 days ago, said Andrew Wallace, the medical center's vice president for health affa s. The surviving twin was at the last time he checked, he said, but hospital officials would not confirm that the twin was still there this weekend.

The baby died after receiving an infusion "to correct an imbalance of electrolytes," Wallace said.

An effort was being made to increase the baby's amount of potassium. Potassium, a major element of fluid inside cells, helps regulate several body functions.

Wallace said no wrongdoing had been found involving doctors or nurses. He said the medical center had changed its procedures as a result, but would not elaborate.

The individuals involved are lar occurrence in the future."

The statement was released after an anonymous caller reported the death to WTVD (channel 11) in Durham.

An autopsy was performed, Wallace said. But results aren't available yet.

, neonatal intensive care unit is one of about 20 in the state. Roughly half of the babies treated come from other hospitals, but Wallace said he did not know if the twins were born at

He declined to identify the baby or say where the family lives.

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Wrong spinal drug fatal to 3-year-old boy with Down syndrome

HARRISBURG (AP) — A 3-year-old Middletown boy with Down syndrome died at Medical Center after a second-year resident accidentally injected a toxic drug into his spinal canal, according to the Patriot-News.

Dr. Michelle Reilly was never disciplined for the mistake, which the Dauphin County Coroner's office concluded was responsible for the death of Michael Lee Sosnoskie.

The accident happened on March 2 when Reilly was instructed to administer one drug into Michael's spinal canal and inject a second intravenously to fight leukemia.

She picked up vincristine, which was supposed to be used intravenously, and injected it into Michael's spinal canal, medical records show. Vincristine is fatal if administered into the spinal canal, medical guides warn.

Reilly, who is training to become a pediatrician, and a registered nurse with 11 months experience were the only medical personnel in

Virginia to be near her husband. She left two weeks ago and now works at Georgetown University Hospital in Washington, D.C.

Michael's parents are angry and want Reilly's license revoked.

"I think Michael deserves a little bit of his justice," said the boy's father, Leon Sosnoskie, a legal assistant with the state Agriculture Department.

The state Board of Osteopathic Medicine, which licenses and regulates osteopathic physicians such as Reilly, was not notified about the accident. By law, hospitals are required to inform the board only if they discipline a doctor.

Rohrer defended Reilly and the hospital's handling of the incident. "She was a very good resident, one of our better residents, and was felt to be competent to do this," he said.

"In terms of disciplinary action, what more disciplinary action can

Harrisburg PA - 1989

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Vincristine

ISMP strongly recommends against dispensing and administering intravenous Vincristine in a syringe.

ISMP strongly recommends dispensing and administering intravenous Vincristine in a minibag.

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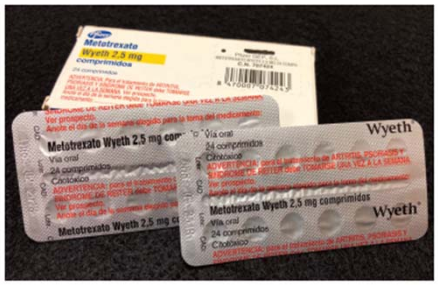
Methotrexate

- Prescribing and dispensing alerts for providers
- Calendar/blister pack
  - Day of week marked
- Labeling weekly only for non-cancer diagnosis
  - No splitting of week (e.g., q12h x 3 doses)
  - Warning for patient on label and in labeling
- Patient weekly dosing info on container
- Dispense safety checklist (ISMP)

The above image illustrates an error with methotrexate. The doctor wrote for the patient to take 4 tablets weekly. But the pharmacy instructed the patient to take 4 tablets daily.



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Improvements to container labels by industry

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Vitalis Company, Colombia

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Harmonizing Safe Medication Container Labeling and Packaging

Create a minimum set of best practices for labeling and packaging aimed at reducing medication errors

- On June 19 and 20, 2018, at the US Food and Drug Administration (FDA) campus in MD, created a minimum set of best practices for labeling and packaging aimed at reducing medication errors.
- Participants agreed that guidelines are needed regarding the presentation of critical label information to deal with look-alike labels, noting that logos and highly stylized graphics detract from readability of the label.

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Principles agreed upon by global regulators at FDA-IMSN summit

- Use metric units for products, and eliminate ratio expressions
- Eliminate potentially error-prone abbreviations and dose designations on labels, such as U for units, IU for international units, or trailing zeros (e.g., 1.0) to express strength
- Prominently display cautionary statements on carton and immediate container labels of neuromuscular blockers, potassium chloride concentrate injection, methotrexate, and other selected error-prone medications
- Include both the per mL and the per container quantity, not the per mL quantity alone, when presenting the concentration for injectables

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Principles agreed upon by global regulators at FDA-IMSN summit

- Use contrasting label backgrounds for the printing on glass ampules, and recommend font size and label orientation, to improve readability
- Physically link or integrate diluents with drugs/vaccines that are powders
- Increase the adoption of ready-to-use/ready-to-administer syringes, premixed IV solutions, unit-dose packaging, and other more efficient, safer packaging, while considering the overall cost of implementation
- Develop product-specific world safety standards; for example, standard packaging for non-oncologic methotrexate to prevent accidental daily use and overdoses
- Include barcodes on packages so they can be scanned at the bedside or other locations where medications are dispensed or administered by healthcare providers

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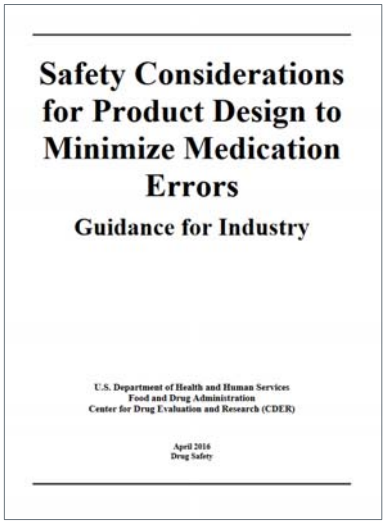
Improvements in container labeling and packaging

Published FDA guidance for industry


Safety Considerations for Product Design to Minimize Medication Errors

Guidance for Industry

U.S. Department of Health and Human Services
Food and Drug Administration
Center for Drug Evaluation and Research (CDER)

April 2016
Drug Safety

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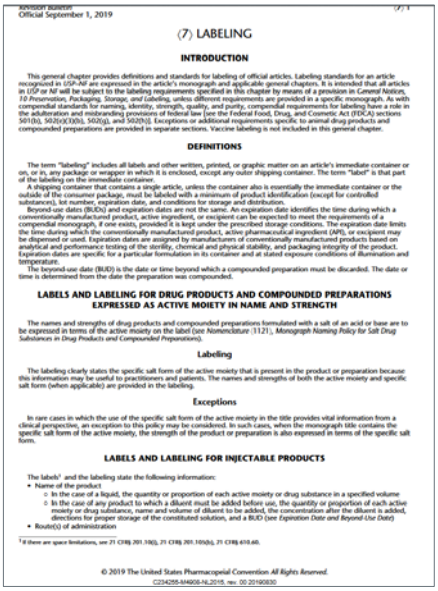
USP Standards



Official September 1, 2019

⟨7⟩ LABELING

INTRODUCTION

This general chapter provides definitions and standards for labeling of official articles. Labeling standards for an article recognized in *USP–NF* are expressed in the article's monograph and applicable general chapters. It is intended that all articles in *USP* or *NF* will be subject to the labeling requirements specified in this chapter by means of a provision in *General Notices, 10 Preservation, Packaging, Storage, and Labeling*, unless different requirements are provided in a specific monograph. As with compendial standards for naming, identity, strength, quality, and purity, compendial requirements for labeling have a role in the adulteration and misbranding provisions of federal law [see the Federal Food, Drug, and Cosmetic Act (FDCA) sections 501(b), 502(e)(3)(b), 502(g), and 502(h)]. Exceptions or additional requirements specific to animal drug products and compounded preparations are provided in separate sections. Vaccine labeling is not included in this general chapter.

DEFINITIONS

The term "labeling" includes all labels and other written, printed, or graphic matter on an article's immediate container or on, or in, any package or wrapper in which it is enclosed, except any outer shipping container. The term "label" is that part of the labeling on the immediate container.

A shipping container that contains a single article, unless the container also is essentially the immediate container or the outside of the consumer package, must be labeled with a minimum of product identification (except for controlled substances), lot number, expiration date, and conditions for storage and distribution.

Beyond-use dates (BUDs) and expiration dates are not the same. An expiration date identifies the time during which a conventionally manufactured product, active ingredient, or excipient can be expected to meet the requirements of a compendial monograph, if one exists, provided it is kept under the prescribed storage conditions. The expiration date limits the time during which the conventionally manufactured product, active pharmaceutical ingredient (API), or excipient may be dispensed or used. Expiration dates are assigned by manufacturers of conventionally manufactured products based on analytical and performance testing of the sterility, chemical and physical stability, and packaging integrity of the product. Expiration dates are specific for a particular formulation in its container and at stated exposure conditions of illumination and temperature.

The beyond-use date (BUD) is the date or time beyond which a compounded preparation must be discarded. The date or time is determined from the date the preparation was compounded.

LABELS AND LABELING FOR DRUG PRODUCTS AND COMPOUNDED PREPARATIONS EXPRESSED AS ACTIVE MOIETY IN NAME AND STRENGTH

The names and strengths of drug products and compounded preparations formulated with a salt of an acid or base are to be expressed in terms of the active moiety on the label (see *Nomenclature* ⟨1121⟩, *Monograph Naming Policy for Salt Drug Substances in Drug Products and Compounded Preparations*).

Labeling

The labeling clearly states the specific salt form of the active moiety that is present in the product or preparation because this information may be useful to practitioners and patients. The names and strengths of both the active moiety and specific salt form (when applicable) are provided in the labeling.

Exceptions

In rare cases in which the use of the specific salt form of the active moiety in the title provides vital information from a clinical perspective, an exception to this policy may be considered. In such cases, when the monograph title contains the specific salt form of the active moiety, the strength of the product or preparation is also expressed in terms of the specific salt form.

LABELS AND LABELING FOR INJECTABLE PRODUCTS

The labels[1] and the labeling state the following information:

- Name of the product
  - In the case of a liquid, the quantity or proportion of each active moiety or drug substance in a specified volume
  - In the case of any product to which a diluent must be added before use, the quantity or proportion of each active moiety or drug substance, name and volume of diluent to be added, the concentration after the diluent is added, directions for proper storage of the constituted solution, and a BUD (see *Expiration Date and Beyond-Use Date*)
- Route(s) of administration

[1] If there are space limitations, see 21 CFR§ 201.10(j), 21 CFR§ 201.10(k)(1), 21 CFR§ 610.60.

C234265-MM606-NL2015, rev. 00 20190830

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Standards changed to improve safety

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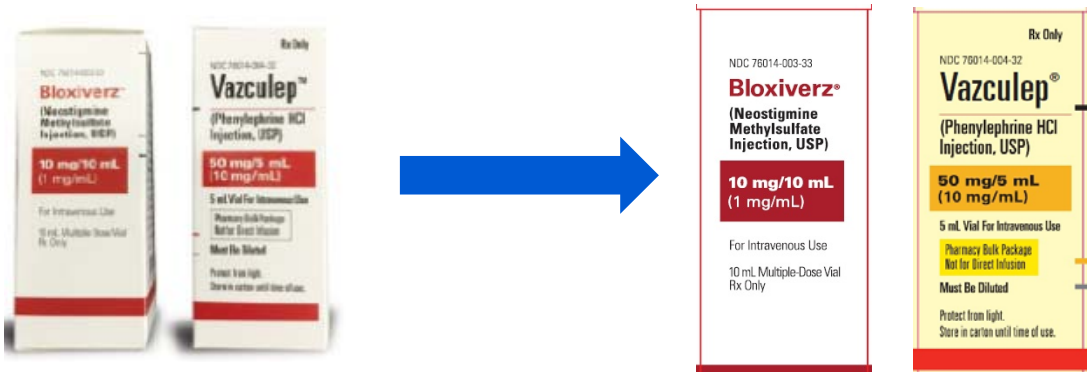

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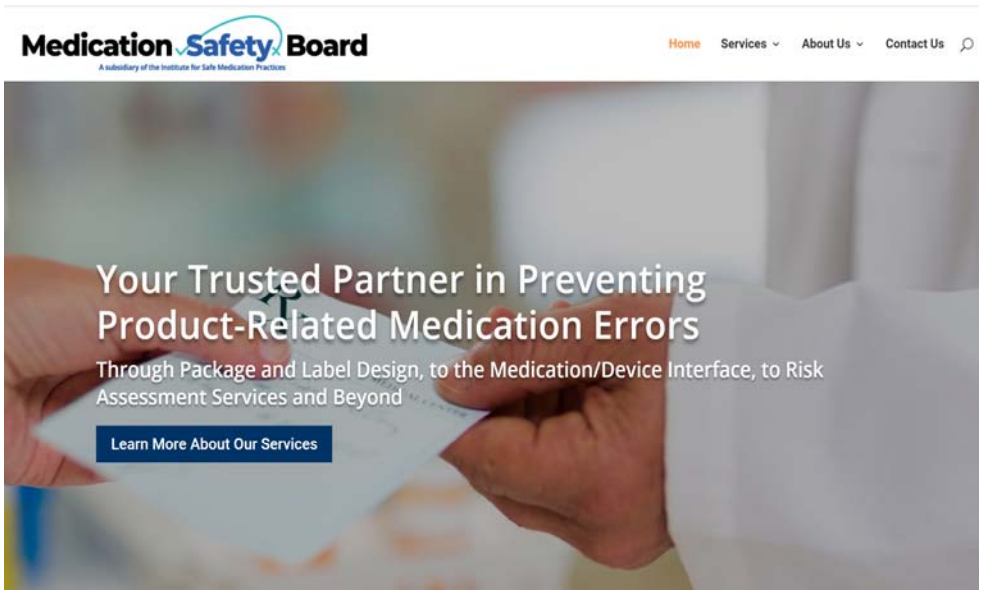

https://www.medicationsafetyboard.com/

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National Medication Error Reporting System

- Early warning system
  - Issue nationwide hazard alerts and press releases
- Learning
  - Dissemination of information and tools
- Change
  - Product nomenclature, labeling, and packaging changes, device design, practice issues
- Standards and Guidelines
  - Advocates for national standards and guidelines

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Where does ISMP get its information?

Consumer MERP
Practitioners
ISMP MERP/VERP
FDA MedWatch
Other sources

ISMP Institute for Safe Medication Practices
An ECRI Affiliate
ISMP Canada
ISMP Spain
ISMP Brazil
IMSN

Practitioners
Organizations
Consumers
Regulatory
Industry

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MERP: National Medication Errors Reporting Program
VERP: National Vaccine Errors Reporting Program
IMSN: International Medication Safety Network

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Medication error case reports

- FDA has Memorandum of Understanding (MOU) agreement with ISMP to share publicly available medication error information
- FDA and ISMP hold regular monthly meetings to discuss regulated product issues. We meet in person twice annually.

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ISMP relationship with the U.S. Food and Drug Administration (FDA)

- Discuss regulated product issues
  - **Nomenclature**
  - **Labeling, packaging**
  - **Relationship between medication and medical device**
- FDA Advise-ERR publications
- ISMP and FDA share fellowship program
- FDA guidance statements based in part on ISMP reporting program findings

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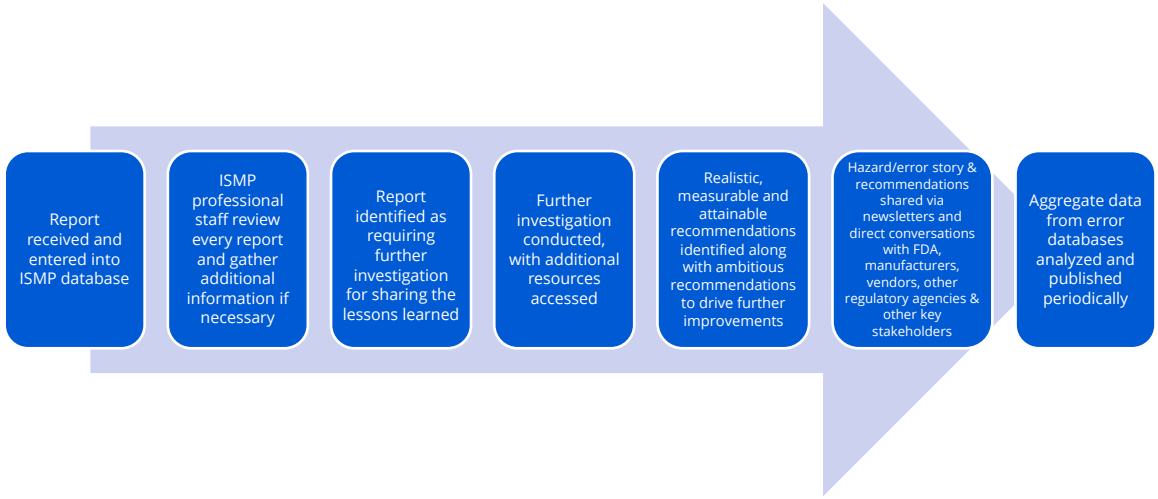
Process when hazard or error reported to ISMP – Every report is indispensable!



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Provider error reporting programs

- Narrative information driven by provider and/or consumer altruism
- A key to success globally
- Always confidential, can be legally shielded from discovery if requested
- Interact with regulators, standards organizations, accreditors, professional organizations, pharmacovigilance agencies

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Are we making progress?

- Increased reporting of medication errors and focus on safety
- Support for root cause analysis
- Improvements in safety culture
  - **Problems now addressed as "system issues" vs. "people issues"**
  - **Accreditation standards (Government, Accreditors, etc.)**
    - National Patient Safety Goals
    - International Patient Safety Standards (Joint Commission International)
    - Medication Management Standards
- Identification of high alert drugs

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ISMP List of High-Alert Medications in Acute Care Settings

Classes/Categories of Medications

Specific Medications

Background

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https://ismp.org/recommendations/high-alert-medications-acute-list

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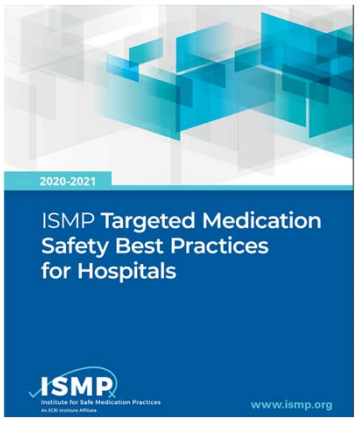
Targeted Medication Safety Best Practices for Hospitals

Purpose: Inspire widespread adoption of consensus-based best practices on specific error-related issues that continue to harm patients and/or cause death.

- Revised every two years since 2014
- Hospitals and health systems can focus their medication safety efforts on these Best Practices, which are realistic and have been successfully adopted by numerous organizations.
- While targeted for the hospital-based setting, some Best Practices are applicable to other healthcare settings.



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https://ismp.org/guidelines/best-practices-hospitals

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2020-2021 Targeted Medication Safety Best Practices

Purpose: inspire widespread adoption of consensus-based best practices on specific error-related issues that continue to harm patients and/or cause death

- Primary target areas:
  - IV vincristine
  - Oral methotrexate
  - Patient weights in metric units
  - Neuromuscular blocking agents
  - High alert drug via smart pumps
  - Availability of antidotes and rescue agents
  - Use of oral syringes
  - Oral liquid dosing devices
  - Glacial acetic acid
  - Eliminate liter bags of sterile water
  - Use of technology for IV admixture compounding
  - Being proactive by using information about errors happening elsewhere
  - Eliminate promethazine
  - Verify and document a patient's opioid status and level of pain
  - Limit variety of medications for removal using the override function.

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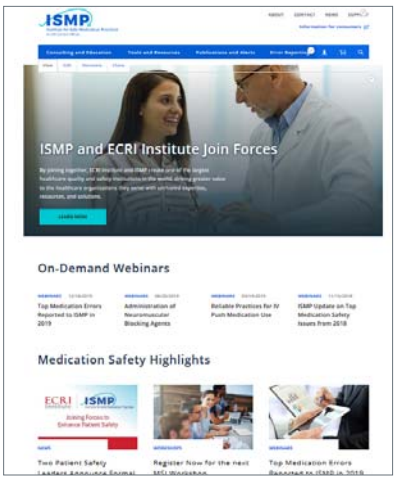
ISMP Websites



www.ismp.org

www.medsafetyofficer.org

www.consumermedsafety.org

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Drug Name Mix-ups

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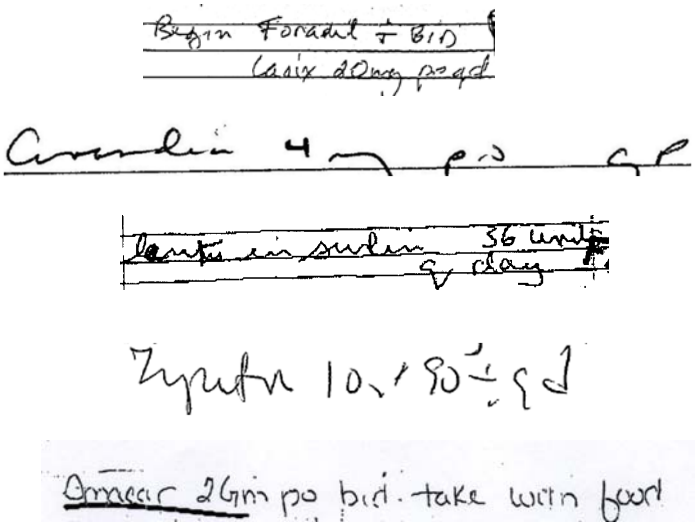
Look-alike and Sound-alike Drug Names



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Preventing drug name mix-ups

- Drug name development
  - Published FDA guidance for industry
  - FDA premarket screening
    - Phonetic and orthographic computer analysis (POCA)
    - Simulation review by internal staff
    - Expert analysis and summary in conjunction with New Drug Application (NDA)
  - Use of "Tall Man" letters (metroNIDAZOLE 500 mg vs. metFORMIN 500 mg)
    - Important new issue is first few letter characters and similar strengths
  - Indication-based prescribing
- Premarket practitioner testing
- Role of trademark testing firms and premarket testing of labeling & packaging

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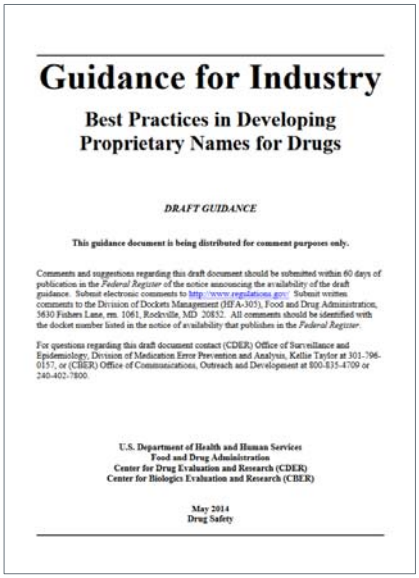
FDA Guidance Statements



Guidance for Industry

Best Practices in Developing Proprietary Names for Drugs

DRAFT GUIDANCE

This guidance document is being distributed for comment purposes only.

Comments and suggestions regarding this draft document should be submitted within 60 days of publication in the *Federal Register* of the notice announcing the availability of the draft guidance. Submit electronic comments to http://www.regulations.gov/. Submit written comments to the Division of Dockets Management (HFA-305), Food and Drug Administration, 5630 Fishers Lane, rm. 1061, Rockville, MD 20852. All comments should be identified with the docket number listed in the notice of availability that publishes in the *Federal Register*.

For questions regarding this draft document contact (CDER) Office of Surveillance and Epidemiology, Division of Medication Error Prevention and Analysis, Kellie Taylor at 301-796-0157, or (CBER) Office of Communications, Outreach and Development at 800-835-4709 or 240-402-7800.

U.S. Department of Health and Human Services
Food and Drug Administration
Center for Drug Evaluation and Research (CDER)
Center for Biologics Evaluation and Research (CBER)

May 2014
Drug Safety

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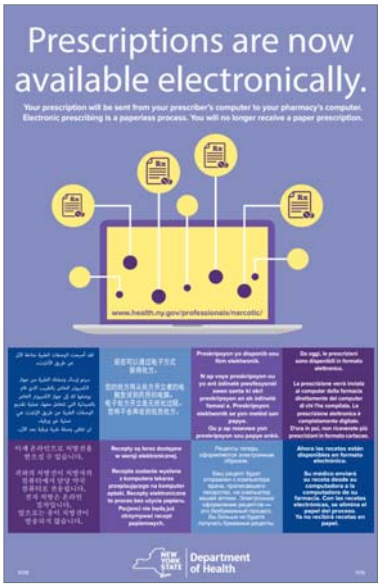
Adoption of safety technologies

- Elimination of handwritten prescriptions
  - NY State Rule
  - More than 90% of US Hospitals e-Prescribe
  - More than 90% of Pharmacies accept e-Prescribing
  - More than 80% doctor offices have available e-prescribing
  - Many states require for controlled drugs
- Screen selection errors have increased due to typing first few letter characters and getting similar names on screen



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Adoption of safety technologies

- FDA regulations require that certain human drug and biological product labels contain a bar code consisting of, at a minimum, the National Drug Code (NDC) number (21 CFR 201.25).
- Bedside bar code scanning (drug and patient)
- Community pharmacy bar coding, screen imaging, DUR, adjudication of Rx, etc.

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Adoption of safety technologies

- "Smart" infusion pumps in hospitals

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Automated dispensing cabinets

- Limitations imposed when removing medications on override

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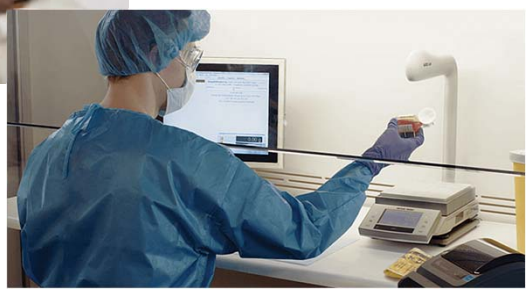
IV workflow systems (imaging, scanning, weighing, of compounded sterile products, etc.)



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Sterile compounding safety

- Technology solutions (e.g., systems that include barcode scanning verification of ingredients, gravimetric verification of drug and diluent volumes, and/or robotic image recognition) are utilized to augment manual processes for preparing and verifying CSPs.
- Barcode scanning is linked to the patient specific order to identify products used in the preparation of CSPs.
- ISMP guidelines call for both bar coding and gravimetrics to be used when preparing chemotherapy and, ideally, for pediatric CSPs (several semiautomated-manual systems and highly automated robotic systems utilize bar coding and gravimetrics).

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Prefilled premixed ready to use

- Too many nurses and anesthesia personnel still must prepare their own doses, thus risking error
- Some compounding by pharmacy could be eliminated by use of ready to use products

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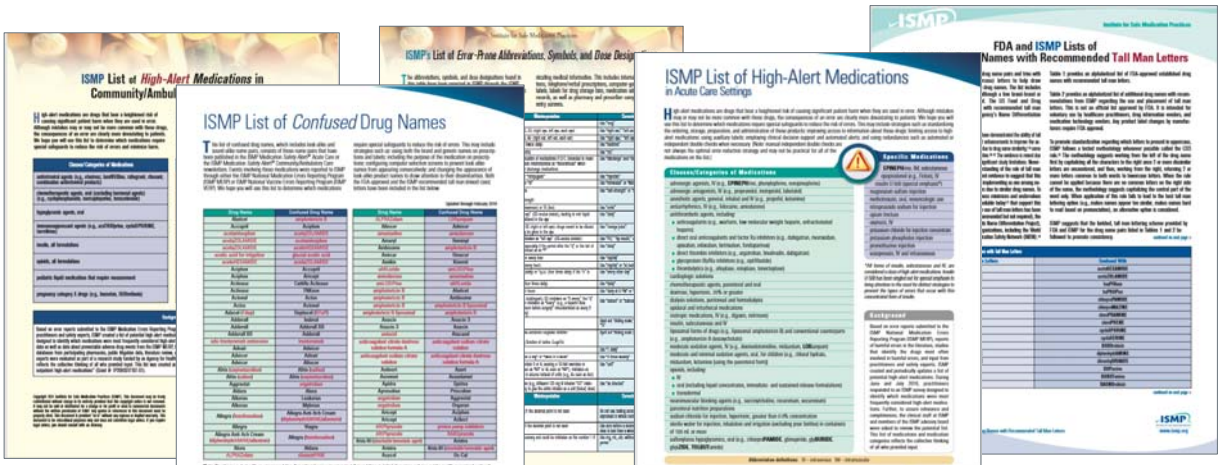
ISMP Guidance

ISMP guidelines, ISMP self assessments, ISMP safe practice lists (look-alike drugs, tall man letters, safe electronic communication, etc.)



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https://ismp.org/resources

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Medication Safety Guidelines

Most guidelines are driven by multi-disciplinary summits that include a review of the literature, assessment of reported errors, and input from experts. Final statements are developed by consensus decision making.

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https://www.ismp.org/guidelines

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New standards to prevention catheter misconnections

- ENFit
- NRFit

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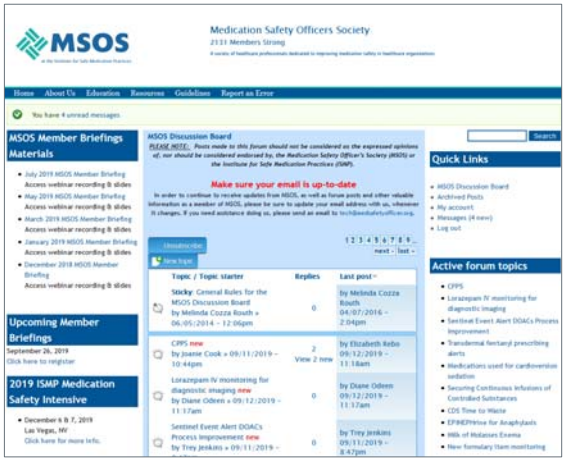
Emphasis on safety in healthcare

- Improvements in safety culture
  - **Problems now addressed as "system issues" vs. "people issues"**
- Safety committees in hospitals
- Medication safety officers



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More efforts to educate patients about safe medication use

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Where should further efforts be directed to improve medication use safety?

- Reduced reliance on nurses and anesthesiologists to prepare medication doses
- Greater availability of premixed IV medication solutions in flexible containers
- Greater availability and use of prefilled, ready to use medication syringes
- Availability of container bar code or radiofrequency identification (RFID)
  - **For use by pharmacists in sterile and nonsterile compounding, product inventory and storage, and product dispensing**
  - **For unit dose packaging or patient packs so medications can be scanned at point of care**
- Manufacturer adherence to guidelines established by global regulators and the International Medication Safety Network

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Where should further efforts be directed to improve medication use safety?

- Creation of independent, voluntary provider error reporting programs that focus less on data than learning what went wrong and what needs to be done to prevent problems in the future
- Increased cooperation between independent provider error reporting programs, regulators, standards organizations, accreditors
- Increased cooperation between manufacturers and independent provider reporting programs
- Mandated patient education regarding information needed for safe use of certain identified high alert drugs

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ISMP greatly appreciates
Novartis Pharmaceuticals Corporation
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for support for this program

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Global Progress in Patient Safety and Prevention of Harmful Medication Errors

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