Vol. 34 No. 7 - July 2005

drug therapy topics

ISSN 0882-6684

Harborview Medical Center / Seattle Cancer Care Alliance / University of Washington Medical Center

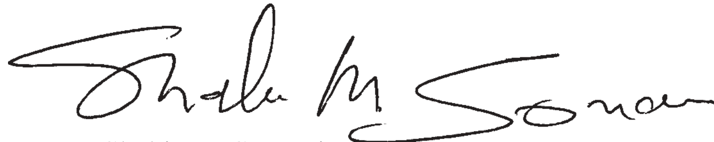
Welcome, New House Staff

On behalf of the Department of Pharmacy Services at the University of Washington Medical Center, Harborview Medical Center, Seattle Cancer Care Alliance, and UW Medicine Neighborhood Clinics, I would like to welcome you. We look forward to working with you during your residency.

You will be receiving copies of the *Drug Therapy Topics* newsletter on a monthly basis. This newsletter is a source of current pharmacotherapy-related information as well as a major communication between the Department of Pharmacy Services, the Pharmacy & Therapeutics Committee, and the Medical Staff. It is intended, in part, to keep you updated on additions and deletions to the medical centers' formulary, along with changes in policies and procedures as approved by the Pharmacy and Therapeutics Committee. Your input into its content is welcome.

The medical centers' *Drug Formulary* provides key information regarding drug availability, along with procedures pertaining to medication use. You will be provided with a personal copy of the formulary. For expanded and updated clinical details on all drugs and for "alerts" regarding formulary drugs, you may also access the formulary and the UW Drug Information Center web site electronically at http://uw.prnrx.org.

If you have any questions regarding pharmacy services, please ask the clinical pharmacist on the unit or in the clinic or call one of the following pharmacy phone numbers. Again, a sincere welcome from all of us.



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A University of Washington Drug Information Center publication
Distributed monthly by authority of the Pharmacy and Therapeutics Committee
Editor: Nelda A. Murri, Pharm.D. (206) 598-6612 – Asst. Editor: Elizabeth Rudy, D.V.M., R.Ph.
Department of Pharmacy Services / School of Pharmacy

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Medication Management: Strategies to Maximize Patient Safety

Extracted from *Drug Therapy Topics* 2003 (Vol. 32 No. 3 pages 11-14).

Definition: ***Patient Safety*** *– Freedom from accidental or preventable injuries produced by medical care.*[1]

Definition: ***Adverse Drug Event (ADE)*** *- A negative consequence of medication use encompassing both mistakes that result in harm to the patient (preventable ADEs) and adverse drug reactions (unavoidable ADEs).*

It is estimated that more than 1 million serious medication errors occur every year in U.S. hospitals.[2] Over half of all medication errors classified as serious result in preventable adverse drug events (ADEs) and approximately 20% of preventable ADEs are life-threatening[3] (see Figure 1: A "Systems" Approach to Drug Therapy Complications).

ADEs have been associated with longer hospital stays, higher costs, and higher risk of death.[5] The Adverse Drug Event Prevention Study Group found that ADEs occur in 6.5 of every 100 hospital admissions,[6] with 42% of these events being either serious or life-threatening.[7] The average cost of an ADE has been estimated to be over $2,000, translating to an excess cost of over $5.6 million per year for an average-sized teaching hospital.[8] Research has identified excessive dosage (42%), drug interactions (4.6%), patient identification errors (3.5%), and cases of known drug allergies (1.5%) as the leading causes of preventable ADEs.[9,10] Analysis of the FDA's Adverse Event Reporting System showed that between 1993 and 1998 the most common types of fatal errors—improper dose (41%), wrong drug (16%), and wrong route of administration (10%) —were largely attributable to communication errors.[11]

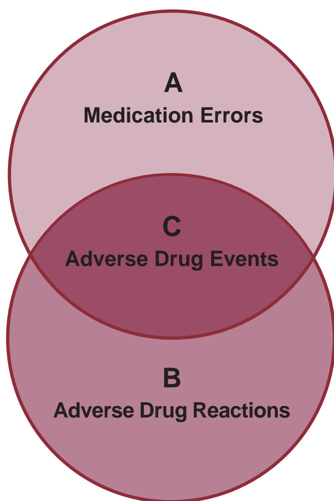
In 1999, the Institute of Medicine (IOM) set a 50% reduction in medical errors as a 5-year national goal.[13] Subsequently, a Presidential Mandate to implement IOM safe practice recommendations required that all hospitals participating in Medicare establish patient safety initiatives, including safety-oriented approaches to medication errors.[14] Adding bottom-line incentives, the Business Roundtable's *Leapfrog Group* has begun to shift market share toward providers that adopt patient safety standards[9] and some health plans are offering financial rewards to providers who meet intensified safety standards.[15] While computerized physician order entry (CPOE) systems have been shown to reduce medication errors by more than 50%,[16] employing a multidisciplinary approach that includes a pharmacist on the patient care team (e.g., the current UW clinical pharmacy practice model) has been associated with a 77% reduction in medication errors.[9] The most recent IOM report, "Priority Areas for National Action: Transforming Health Care Quality," identifies ***medication management*** as a national priority and points to the critical role that pharmacists play in monitoring patients' drug therapies.[17] Medication management strategies that combine CPOE with advanced clinical pharmacy practice models are likely to further reduce accidental or preventable injuries caused by medications.

Patient groups identified to be most at risk for adverse drug events include elderly patients with chronic illnesses who are treated with multiple medications,[18] children who

Figure 1: ***A "Systems" Approach to Drug Therapy Complications***[4]

Good people make mistakes.

Education and counseling can decrease the likelihood of that person committing that error again. However, process changes can decrease the likelihood of *all* persons committing that error. This "systems" approach to Drug Therapy Complications involves implementing checks-and-balances or forcing constraints (such as storing concentrated KCl solutions away from patient care areas).



Type	Representation	Example	Preventable?	Root Cause / Systems Approach to Correction
A Medication Errors	Errors that have been intercepted prior to reaching the patient or that occur but result in no adverse outcome.	An order for digoxin 0.25mg misinterpreted or mistakenly ordered as 2.5mg. Intercepted and corrected before the dose is given, no harm to the patient results.	Yes	**Root Cause:** Generally a breakdown in one or more parts of the system. **Intervention:** Implement system changes to prevent future occurrences.
B Adverse Drug Reactions	Unintended and undesired side effects of drugs which occur when the drug is used in a manner appropriate for the patient`s clinical condition. Adverse drug reactions can an be predictable or unpredictable.	*Predictable & expected:* Hair loss following chemotherapy. *Unpredicatble & unexpected:* Development of a first-time allergic reaction to a penicillin.	No	**Root Cause:** Patient hypersensitivity or idiosyncrasy. **Intervention:** Prevent inadvertant rechallenge.
C Adverse Drug Events	Errors that result in harm to the patient.	Anaphylaxis following administration of a penicillin derivative to a patient with a known penicillin allergy.	Yes	**Root Cause:** Generally a breakdown in multiple parts of the system. **Intervention:** Identify causes and change systems to prevent future occurrences.
A + B + C	Drug therapy complications, i.e., any medication error or adverse reaction related to a medication. Drug therapy complications may or may not result in patient harm and may or may not be preventable.			

"...the single most common error cited in high-risk professions from aviation or medicine: the failure to share key pieces of communication."
Boston Globe columnist Ellen Goodman, 2/27/03[12]

Medication safety reporting systems are key to preventing adverse drug events. Likewise, reporting adverse drug reactions to pharmacy is key to preventing subsequent inadvertent patient rechallenge.

Because they are error-prone, initial lists of "home medications" should be verified using an effective reconciliation process prior to generating inpatient admit orders.

Dilutions Quick Review

1:10,000 =
1g/10,000mL
1,000mg/10,000mL
1mg/10mL
0.1mg/mL

1:1,000 =
1g/1,000mL
1,000mg/1,000mL
1mg/mL

require weight-based dosing adjustments,[19] and patients recently discharged from hospitals.[20] According to research published in the February 4, 2003 issue of the Annals of Internal Medicine, nearly 20% of 400 patients discharged from a large teaching hospital experienced an "adverse event" after discharge.[21] Thirty percent of these patients were temporarily disabled and 2/3 of the incidents were judged to have been preventable via better communication among practitioners and patients. This landmark study suggests that there is room to improve safety during the critical transition from hospital to home. To this end, patients play a vital role in helping to prevent adverse drug events by sharing responsibility for their own safety.[6] Because patients are the final link in the medication management process, health care providers should encourage patients to protect themselves from potential medication errors (see www.getrxhealth.com). Likewise, prescribers should strive to clarify the purpose of each medication with patients and should include the indication for the medication on the face of the prescription.

"Home medication" discrepancies: One hospital found that 75% of all order clarifications that pharmacists performed after admission could have been fixed before the patients were admitted. By involving pharmacists in an enhanced pre-admission process designed to obtain full medication histories prior to hospital admission, prescribers benefited by having access to verified medication information prior to the generation of admit orders and an 85% reduction in "home medication" discrepancies was realized. To help with the verification process, encourage patients to carry a current list of medications with them to the hospital.

Verbal orders: Avoid using verbal orders as a routine method of order communication. Reserve orders that are spoken in person or by telephone to situations where they cannot be avoided (e.g., orders communicated during a sterile procedure or in emergencies). To minimize confusion, use both the generic and brand names when giving verbal orders. Recipients of verbal orders should always read back to the prescriber exactly what has been transcribed. Additionally, read back the drug name, spell it, and pronounce the dose in single digits (e.g., "five, zero, zero" for 500).

Sound-alike drug names: Confusion over the similarity of drug names, whether written or spoken, is an ongoing problem (see DTT 2001; 30(9):35-40). Literally thousands of name pairs are prone to misinterpretation.[23] Between 15 and 25% of all reports to the USP Medication Errors Reporting Program involve confusion between similar sounding or similar looking drug names. Even orders written with good penmanship have been misinterpreted. To avoid mix-ups, prescribers should indicate the purpose of each medication on prescriptions and indicate both the generic and brand names when prescribing look-alike/sound-alike drug name pairs known to be problematic.

Concentrations of liquids expressed as dilution or percentage: While the concentrations of most liquid medications are stated in units of mg/mL, a few drugs (e.g., epinephrine, lidocaine) have concentrations expressed as a dilution ratio or percentage. Converting ratio or percentage concentrations to weight-based doses is error-prone. Additionally, errors have been reported due to confusion between concentrations (e.g., 1:10,000 *vs.* 1:1,000). It is preferable to prescribe liquid medications by metric weight. If prescribed by volume, clarify the concentration.

Dangerous Abbreviations: Errors resulting from the use of confusing dosage expressions or misunderstood abbreviations persist (see back page). Prescribers are urged to avoid dangerous abbreviations on medication orders.

References available upon request.

Pharmacy & Therapeutics Committee Actions

Formulary Additions	Form(s) & Strength(s)	Classification	Use	Usual Adult Starting Dose*
Acamprosate (Campral)[2]	Tablet, delayed-release: 333mg	Antialcoholic agent	Alcohol dependence	666mg TID
Didanosine (generic)	Capsules, delayed-release: 250mg, 400mg	Nucleoside reverse transcriptase inhibitor	HIV-1 infection	Weight dependent
Iloprost (Ventavis)[1]	Inhalation: 20mcg	PGI_2 analog	Pulmonary hypertension	2.5mcg 6-9 x per day
Rizatriptan (Maxalt)	Tablet: 5mg, 10mg	Serotonin 5-HT_1 Agonist	Migraine	5mg
Treprostinil (Remodulin)[1]	Injection: 1, 2.5, 5, 10mg/mL (20mL)	Vasodilator	Pulmonary hypertension	1.25ng/kg/min SubQ
Formulary Deletions	**Form(s) & Strength(s)**	**Classification**	**Comment**	
Cimetidine (Tagamet)	All	H_2-antagonist	Previously limited to use by Madison Clinic patients.	

* Refer to product labeling for full prescribing information.1 Limited to prescribing by Drs. Ralph and Steinberg or their designees for patients for whom they have obtained prior authorization. 2 Restricted to patients enrolled in a Washington State addiction program.

Dangerous Abbreviations

FACT— Greater than 1 in 10 medication errors are related to the use of confusing expressions of dosage forms and misunderstood abbreviations. Prescribers are urged to avoid dangerous abbreviations when writing medication orders.[22]

Some Dangerous Abbreviations to Avoid	Intended Meaning	Misinterpretation	Safe Practice Recommendation
@	at	Mistaken for "2"	Write "at"
µg	microgram	Mistaken for "mg"	Write "mcg"
U or u; IU	units; international units	Misread as a zero (0); Misread as IV (intravenous)	Always spell out "units"; Eliminate the word "international" and spell out the word "units"
qd	daily	Misread as qid	Write "daily" or "q day"
qod	every other day	Misread as qid; misinterpreted as once daily	Write "every other day" or write "q other day"
Trailing zero (1.0mg)	1mg	Misread as 10mg	Do not use decimals for whole number doses
Naked decimal (.5mg)	0.5mg	Misread as 5mg	Always use a leading 0 before a decimal when the dose is <1unit
MTX, Epi, MS, MSO4, $MgSO_4$	specific drugs	various misinterpretations	Always spell out drug names

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