To find fault is easy; to do better may be difficult*

To truly understand the underlying reasons or root causes contributing to medication errors, we must first understand the medication use system itself. This system is a complex group of related processes including medication prescribing, prescription processing, dispensing, patient education, medication administration, and monitoring. Medication errors are a property of this system as a whole, rather than purely the result of the acts or omissions of the people who interact with the system. Even when an error can be traced to an individual, further investigation will likely determine that a variety of root causes contributed to that individual’s perceived failure. Such root causes could include poor order communication between the physician, nurse, and pharmacist; dangerous medication storage practices; or look-alike packaging and labeling.¹

Unfortunately, when analyzing errors, organizations tend to focus only on those at the active or “sharp end” of the error: the frontline practitioner most directly associated with it, such as the pharmacist who dispensed or the nurse who administered the medication. Some healthcare practitioners are taught early in their careers that they must always be perfect—an unattainable and unrealistic expectation for any human. And when errors occur, the human tendency is to blame individuals. As a result, the practitioners involved may feel guilty and unworthy of their professional status. To make matters worse, they may be unjustly labeled as inattentive, incompetent, lazy, and uncaring, and subjected to disciplinary action, private reprimands, remedial education, or termination. It’s not surprising, then, that these individuals may be tempted to cover up any future errors. In the end, the punitive actions do little, if anything, to prevent the same error from happening again within the organization. It does nothing in the way of focusing attention on the most manageable component of an error: the system itself.

Effective analysis (“root cause analysis”) considers the latent causes of an error. Latent failures (also called blunt end failures) are weaknesses in organizational structures that support medication processes. Such weaknesses include faulty computer systems, incongruent policies, or ineffective personnel training.² Latent failures might, for example, cont’d on page 2

Safety Briefs

Over the past few years, we have received several reports involving mix-ups between the antidiabetic agent AVANDIA (rosiglitazone) and COUMADIN (warfarin). Although it’s difficult to imagine that the two could look alike when handwritten, the order below illustrates how this confusion could occur. In this case, a poorly handwritten prescription for Avandia was taken to a community pharmacy, but Coumadin was dispensed in error. The error went unnoticed until the patient developed a severe intestinal bleeding episode that required a complete bowel resection. The opposite error also could occur. The issue is complicated by the fact that both drugs are available in 2 mg and 4 mg strengths, both are tablets, and, with either drug, patients are usually directed to take one tablet daily. These similarities increase the likelihood that patients could experience a dangerous mix-up.

Since accidental administration of either Avandia or Coumadin could pose a great danger to any patient, pharmacists, physicians, nurses, and patients must be alerted to the possibility that these two drugs could be accidentally mixed up. Prescribers should always write the medication’s purpose on prescriptions for Avandia and Coumadin, and pharmacists and nurses should clarify the purpose before dispensing and administering these drugs. Build alerts into computer order entry systems and add reminder labels to pharmacy containers. And patients should be educated about all of their medications, so they are completely familiar with each product’s name, its purpose, and its appearance.

A patient was admitted to the hospital for treatment of severe psoriasis. SORIATANE (acitretin) 25 mg once daily was prescribed, but the handwritten order was misread and entered into the pharmacy computer system as sertraline (ZOLOFT) 25 mg. Soriatane is a cont’d on page 2
result from decisions made by upper management. By themselves, latent failures often are subtle and may not appear to directly cause an error. Their consequences are hidden, becoming apparent only when they occur together and in combination with failures or “slips” made by individuals at the “sharp end.”

Most important, if we are going to strive to improve medication safety, we must focus on redesigning the system that led individuals down the medication error path. It is critical that information about errors and their root causes be shared within your organization as well as with national reporting programs such as the USP-ISMP Medication Errors Reporting Program (which automatically forwards all reports in confidence to FDA’s MedWatch program). Only then can appropriate analysis discover what latent failures exist and how errors can be prevented. An appropriate analysis must include the assumption that medication errors will occur and that the multifactorial nature of errors is system-based, not people-based. Where medication errors are concerned, the question of who was involved is less important than what went wrong, how it happened, and why it occurred. This systems-based philosophy forms the foundation of ISMP’s approach to medication error prevention.3

ISMP has identified key elements that most significantly influence safe medication use: patient information; drug information; communication of drug information; drug labeling, packaging, and nomenclature; drug storage, stock and standardization; use of devices; environmental factors; staff competency and education; patient education; and quality processes and risk management. The interrelationships among these elements form the structure of the medication use system. Look for a review of these elements in our next issue.


*Plutarch
Is an antithyroid or antimetabolite needed?

**PROBLEM**: A community pharmacist accidentally dispensed the antithyroid medication propylthiouracil 50 mg instead of **PURINETHOL** (mercaptopurine) 50 mg, an antimetabolite for a child with acute lymphoblastic leukemia. His parents noticed that the tablets looked different, but the pharmacist mistakenly believed that a generic product existed and reassured the parents that it was the correct drug. The child received the wrong drug for 6 months. No harm occurred, but he missed 6 months of chemotherapy. Modifications in the therapy and numerous thyroid blood levels were needed.

This is one of several reports in which propylthiouracil was dispensed instead of mercaptopurine. Conversely, mercaptopurine has been dispensed and administered when propylthiouracil had been prescribed. Since propylthiouracil doses are often several hundred milligrams a day, mistakes that result in giving mercaptopurine at these high doses could lead to significant harm, including bone marrow suppression, hepatotoxicity, immunosuppression, and teratogenicity. In one case reported to us, the patient developed pancytopenia and hepatotoxicity.

The two products are often located next to each other, contributing to the risk of an error. Name similarity also is a problem. Although the drug names appear to be quite distinct, there are several common characters that may lead to confusion: both names start with “P” and end with “L”; 50 mg tablet strengths are common to both; and phonetically, the “your” sound in “purine” and “uracil” increase the risk of an error. Also, propylthiouracil is often abbreviated “PTU,” which can be confused with “Purinethol” or even “6MP,” a 3-digit abbreviation used for mercaptopurine.

**SAFE PRACTICE RECOMMENDATIONS**: On several occasions, GlaxoSmithKline, the manufacturer of Purinethol, has sent alerts to pharmacists about the potential for this type of error. Along with their most recent alert in June 2003, they distributed “shelf shouters” that pharmacists can place wherever Purinethol is stored to remind staff about confusion with propylthiouracil and to confirm the indication with the patient. You might also consider affixing auxiliary labels to the drug containers or adding alerts to computers, especially if these drugs are not used frequently.

Never store these drugs in close proximity. Even if prescriptions have been properly entered into the computer, the **cont’d on page 4**
Purinethol (cont’d from previous page)

Incorrect product could be selected if the two medications are near each other on pharmacy shelves. Pharmacies that use bar coding or match the drug container’s national drug code (NDC) number against the one listed in the computer database (and printed along with the label) are less likely to select the wrong container.

Fully investigate patient-reported differences in tablet appearance. Some pharmacy computer systems can provide a picture of each tablet on the screen to help ensure accurate dispensing. Of course, patients should be counseled before either of these medications are dispensed; the counseling session could quickly alert a pharmacist to a potential mix-up.

Prescribers can help avoid errors, too, by listing brand and generic names on prescriptions for Purinethol. Drug names should not be abbreviated; in particular, PTU and 6MP should never be used. If abbreviations are used, a pharmacist should always verify the order with the prescriber before dispensing the product.

Safety Briefs (cont’d from previous page)

The same storage location, even though they should have been stored alphabetically by generic name. A pharmacy technician confused these while putting away an order from the wholesaler. We’ve also received reports of mix-ups between cyclopentolate hydrochloride 1% solution and tropicamide 1% solution, both packaged in almost identical red and white cartons. The containers inside these cartons are equally similar. It takes four times longer to recover from the effects of cyclopentolate than tropicamide, so a mix-up could be significant. All of these ophthalmics are marketed by Falcon Pharmaceuticals, an affiliate of Alcon Laboratories, but we have had similar reports with other manufacturer’s products (see Figure 2). We’ve contacted FDA, AAO, and various manufacturers about ophthalmic mix-ups within the same class, but we’re not optimistic that the situation will change. Purchasing ophthalmics within the same class from different vendors may help prevent errors by minimizing the similarities.

Figure 1

Figure 2