

Appropriate Prescribing of Medications: An Eight-Step Approach

MADELYN POLLOCK, M.D., *University of Kansas Medical Center, Kansas City, Kansas*

ORALIA V. BAZALDUA, PHARM.D., *University of Texas Health Science Center at San Antonio, San Antonio, Texas*

ALISON E. DOBBIE, M.D., *University of Texas Southwestern Medical School at Dallas, Dallas, Texas*

A systematic approach advocated by the World Health Organization can help minimize poor-quality and erroneous prescribing. This six-step approach to prescribing suggests that the physician should (1) evaluate and clearly define the patient's problem; (2) specify the therapeutic objective; (3) select the appropriate drug therapy; (4) initiate therapy with appropriate details and consider nonpharmacologic therapies; (5) give information, instructions, and warnings; and (6) evaluate therapy regularly (e.g., monitor treatment results, consider discontinuation of the drug). The authors add two additional steps: (7) consider drug cost when prescribing; and (8) use computers and other tools to reduce prescribing errors. These eight steps, along with ongoing self-directed learning, compose a systematic approach to prescribing that is efficient and practical for the family physician. Using prescribing software and having access to electronic drug references on a desktop or handheld computer can also improve the legibility and accuracy of prescriptions and help physicians avoid errors. (*Am Fam Physician* 2007;75:231-6, 239-40. Copyright © 2007 American Academy of Family Physicians.)

► **Patient information:** A handout on using medicines wisely, written by the authors of this article, is provided on page 239.

In 2001, persons in the United States younger than 65 purchased a mean of 10.8 prescription drugs and those 65 or older purchased a mean of 26.5 prescription drugs.¹ With that level of prescribing, it is not surprising that errors occur. Minimizing such errors through a systematic approach is recommended by national and international authorities²⁻⁵ and has drawn the attention of consumer advocates.⁶ Review each of the following clinical scenarios for potential prescribing errors, and consider if you have a strategy for avoiding such errors in your own prescribing. All of the scenarios take place during a typical day at a family practice office; scenarios 1 through 4 are phone messages given to you by the nurse and scenario 5 is a patient in the waiting room.

Scenario 1: A five-year-old boy who had pink eye and a clear ocular discharge was started on antibiotic drops four days ago and initially improved, but today the redness and irritation has returned.

Scenario 2: A patient seen yesterday for a sleep-depriving cough was started on antibiotics, but the cough still kept her awake last night.

Scenario 3: A generally healthy 70-year-old

woman who takes nonsteroidal anti-inflammatory drugs (NSAIDs) for her osteoarthritis now reports ankle edema. In your absence, a colleague had started her on a calcium channel blocker for newly diagnosed hypertension.

Scenario 4: A 20-year-old woman with sinus pain who was prescribed a fluoroquinolone by the overnight call physician called this morning to request a cheaper alternative medication.

Scenario 5: A 29-year-old woman has presented to the office. She is obese, has type 2 diabetes, and is reporting elevated blood pressures measured at home and at work. You are considering starting her on an angiotensin-converting enzyme inhibitor.

This article summarizes and adapts the recommendations from the World Health Organization's (WHO) Guide to Good Prescribing.² The use of these guidelines should help physicians to minimize prescription errors and improve prescribing quality.

Step 1. Evaluate and Clearly Define the Patient's Problem

In scenario 1, the child treated with antibiotic drops likely had a viral conjunctivitis that did not need specific treatment.⁷ If the child has

SORT: KEY RECOMMENDATIONS FOR PRACTICE

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>
Use a systematic approach to prescribing to decrease errors, help patients avoid adverse events, and improve intended outcomes.	C	2, 10
Discontinue use of abbreviations and non-English characters in prescription writing.	C	13
Provide patient education at the time of prescribing to improve patient adherence to pharmacotherapy.	C	18
Use electronic prescribing tools to prevent errors caused by drug interactions and poor handwriting.	C	23, 24

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 149 or <http://www.aafp.org/afpsort.xml>.

become sensitive to the prescribed medication, his recurrent symptoms represent morbidity related to an unnecessary prescription.

In scenario 4, it is assumed that the woman with sinus pain was diagnosed with a bacterial infection over the telephone on the basis of a symptom, rather than as part of an examination. Prescribing a quinolone to a woman of childbearing age exposes her child to serious teratogenic side effects if she turns out to be pregnant. Defining the problem clearly as “sinus pain in a woman of childbearing age” might have led to a more appropriate management course.

Step 2. Specify the Therapeutic Objective

Specifying the therapeutic objective allows physicians to direct prescribing to a clear goal with expected outcomes. This can be illustrated using several of the clinical scenarios. In scenario 5, which involves the woman with diabetes and the added diagnosis of hypertension, one clear therapeutic objective would be to obtain sustained blood pressure readings of less than 130/80 mm Hg.⁸

In scenario 2, which involves the patient with nocturnal cough, the objective of restoring sleep was not met with the antibiotic prescription; the antibiotic was most likely unnecessary.⁹ For the woman with sinus pain (scenario 4), even if an antibiotic was necessary, prescribing a medication that the patient could not afford clearly missed the therapeutic objective.

Other common examples of nonspecific prescribing include using benzodiazepines for insomnia without investigating the cause, and using analgesics without diagnosing the

underlying source of pain. Setting clear therapeutic goals is particularly important in conditions that have treatment objectives that vary depending on risk factors (e.g., dyslipidemia in patients with or without diabetes).

Step 3. Select the Appropriate Drug Therapy

The WHO guide suggests that physicians develop a formulary of personal drugs (P-drugs).² P-drugs are effective, inexpensive, well-tolerated drugs that physicians regularly prescribe to treat common problems. Detailed guidance on developing a personal formulary can be found in the WHO manual, which is available at http://whqlibdoc.who.int/hq/1994/WHO_DAP_94.11.pdf.² The STEPS (Safety, Tolerability, Effectiveness, Price, Simplicity) framework also can help with building a P-drug formulary.¹⁰

The P-drug and STEPS approaches can be shown using the example of the woman with diabetes and the added diagnosis of hypertension presented in scenario 5. Generic formulations of hydrochlorothiazide (Esidrix), lisinopril (Zestril), metoprolol succinate (Toprol XL), and metoprolol tartrate (Lopressor) are all potential P-drug medications. Except for metoprolol tartrate, all of these drugs can be administered once daily. Lisinopril offers both blood pressure control and prevention of diabetic complications,¹¹ but it is contraindicated if the patient is not using a reliable form of birth control. It also is more expensive than hydrochlorothiazide. Metoprolol reduces blood pressure and diabetic complications.¹¹ However, metoprolol tartrate requires twice-daily dosing, which can affect adherence, and metoprolol succinate is

TABLE 1
STEPS Framework: An Example of How to Select a Personal Drug (P-Drug) for a Patient

Drug*	Safety	Tolerability	Effectiveness	Price	Simplicity
Hydrochlorothiazide (Esidrix)	F	F	F	SF	SF (once daily)
Lisinopril (Zestril)	V†	F	SF	V	SF (once daily)
Metoprolol tartrate (Lopressor)	F	F	SF	F	F (twice daily)
Metoprolol succinate (Toprol XL)	F	F	SF	U	SF (once daily)

STEPS = Safety, Tolerability, Effectiveness, Price, and Simplicity; F = favorable; SF = strongly favorable; V = varies in safety and price depending on specific patient characteristics and local costs; U = unfavorable.

*—All of these drugs are available in generic form.

†—Lisinopril would get a U rating for safety if the patient was a female of childbearing age who was pregnant or not using reliable birth control.

Information from reference 10.

typically more expensive. Hydrochlorothiazide is the cheapest, but it does not carry the extra benefit of avoidance of diabetic complications. A STEPS assessment (*Table 1*¹⁰) will balance the convenience, effectiveness, and benefit of each drug for a particular patient. This analysis may lead to different drug selections for different patients.

In scenario 3, which involves the patient with osteoarthritis, inappropriate prescribing may have been harmful. Her hypertension may be a side effect of the NSAID she was receiving, and her ankle edema could be a side effect of the antihypertensive she was receiving. Perhaps the NSAID should have been discontinued and an adequate dose of acetaminophen, taken three or four times daily, should have been prescribed for her pain rather than adding another medication and inducing a second side effect. This example illustrates that it is important to consider a patient's age, chronic disease status, and other medications currently being taken before choosing a treatment.

Step 4. Initiate Therapy with Appropriate Details and Consider Nonpharmacologic Therapies

Prescriptions should be clear, legible, and written in plain English. The National

Coordinating Council on Medication Error Reporting and Prevention recommends eliminating most abbreviations for medication instructions, such as qd (daily), qid (four times daily), and qod (every other day). They also recommend eliminating abbreviations for drug names, such as MSO₄ (morphine sulfate).¹² To be effective, prescribers should eliminate nonstandard abbreviations that are easily misread, such as non-English characters (e.g., μ).¹³ Using plain English for all prescription writing allows the patient to read and draw attention to any errors.¹⁴

Prescriptions should include specific indications for anticipated duration of therapy. For example, write out "as needed for severe back pain" instead of using the abbreviation prn (as needed). Adding the statement, "instructions in Spanish please," to the prescription (perhaps implemented as a check box on the prescription form) offers a safety net for physicians and pharmacists to reduce prescribing errors for Spanish-speaking patients.¹⁴ Patients taking complex prescriptions like prednisone tapers may need additional written instructions, as may visually impaired patients who have difficulty reading medicine bottle labels. Physicians should consider reducing transcription errors by prescribing electronically.^{12,14}

Nonpharmacologic therapy remains an important treatment option. In scenario 5, the woman with diabetes and the added diagnosis of hypertension may not need medication if she loses weight and exercises. A patient with chronic headaches may respond to relaxation training,¹⁵ and a patient with insomnia may improve with better sleep hygiene.¹⁶ Studies have shown that physicians often write prescriptions of doubtful benefit because of perceived pressure to prescribe medications. However, these perceptions may be inaccurate. Asking a patient directly about therapeutic goals may shed light on his or her willingness to use nonpharmacologic options when available.¹⁷

Avoid using abbreviations for medication instructions, such as qd (daily), qid (four times daily), and qod (every other day).

Step 5. Give Information, Instructions, and Warnings

Physicians should educate patients about the intended use, expected outcomes, and potential side effects for each prescribed medication.¹⁸ Although it is impossible to describe each side effect for a given medication, it is important to address the common and the rare but serious ones. Physicians must describe how the medication should (and should not) be administered, including any important relationships to food, time of day, and other medications being taken by the patient.

In scenario 5, the woman with diabetes and the added diagnosis of hypertension should be informed that lisinopril will reduce her blood pressure, protect her kidneys, and could cause a rare but serious reaction called angioedema that demands immediate medical attention. She should also know that approximately one in 15 patients experiences cough with or without altered taste sensation. When communicating risk, use absolute numbers (e.g., one in 15), rather than percentages, probabilities, odds, or likelihoods, to make it easier for the patient to understand.

Physicians also may want to highlight special drug-related information such as avoiding alcohol when taking metronida-

zole (Flagyl), staying out of the sun when taking tetracycline, and the possibility of sexual side effects with selective serotonin reuptake inhibitors. Explaining that certain side effects are time-limited can help prevent a patient from discontinuing a needed therapy.¹⁴ Patients can demonstrate their understanding of the medication by repeating back pertinent information. At the end of the visit, the prescriber should ensure that the patient knows when to return for monitoring and whether therapy continues after this single prescription.

Step 6. Evaluate Therapy Regularly

Systematically reviewing medications at every visit allows the prescriber to monitor treatment effectiveness and reduce problems, particularly in older patients who are most susceptible to polypharmacy.¹⁹ A medication review may include revisiting a diagnosis, evaluating possible side effects, searching for drug interactions, and ceasing unnecessary medications. For example, an antihypertensive may be discontinued after a patient loses weight, or an NSAID for back pain may be stopped after continued exercise and physical therapy.

A review also helps avoid the prescribing cascade, which involves a physician adding additional drugs to a patient's regimen to treat side effects of other medications.²⁰ In scenario 3, the patient's ankle edema may be a side effect of the calcium channel blocker that was prescribed to treat her hypertension. The hypertension may be a side effect of her pain medication. Planning regular monitoring for certain medications is important. In scenario 5, if the patient is on lisinopril, she will need follow-up serum chemistries to assess for hyperkalemia or increased serum creatinine.

Step 7. Consider Drug Cost When Prescribing

Physicians often fail to consider cost as an important prescribing factor.²¹ Among Medicare beneficiaries, 56 percent use prescription medications costing more than \$500 per year, and 38 percent require medications costing \$1,000 or more per year.²²

In one study, two thirds of older patients planned to underuse their medications because of cost.²¹ Even for patients not requiring chronic medications, filling a prescription that costs the equivalent of several days' pay can be an unpleasant shock.

Asking about a patient's access to a medical prescription card can help to avoid formulary conflicts and delays in starting therapy. Prescribing and drug reference software can inform physicians and patients about medication costs and coverage on the insurance company's formulary (Table 2). A local pharmacist also can suggest alternatives that decrease cost.

Step 8. Use Computers and Other Tools to Reduce Prescribing Errors

Optimal use of the first seven guidelines requires a working knowledge of current medications and keeping up to date on new drugs. The sources described in Table 2 provide more objective, evidence-based data than pharmaceutical representatives or advertisements. Given the pace of change in pharmacotherapeutics, physicians should use continuously updated software for their handheld or desktop computers and are strongly advised to consider using electronic prescribing programs.^{23,24}

Physicians also can access therapeutic guidelines from sources like the National Guideline Clearinghouse, which can be found at <http://www.guidelines.gov>. These sources provide clear statements about the strength of evidence supporting their recommendations. Evidence indicates that many new medications offer little or no benefit over drugs that may already be in a personal formulary. More than 10 percent of new drugs on the market in the last 25 years have earned a black box warning or have been withdrawn from the market. For this reason, physicians should not prescribe new medications until they have been demonstrated to be safer or more effective at improving patient-oriented outcomes than existing drugs.²⁵

When evaluating new drug studies, physicians should look for evidence that the new drug also improves patient-oriented outcomes more than older drugs, and not

TABLE 2
Resources for Better Prescribing*

Web sites

American Family Physician STEPS collection, <http://www.aafp.org/afp/steps> (free access)
MerckMedicus, <http://www.merckmedicus.com> (free access)
The Medical Letter, <http://www.medicalletter.org> (requires a subscription)
Prescriber's Letter, <http://www.prescribersletter.com> (requires a subscription)

Software for handheld computers

Johns Hopkins Antibiotic Guide, <http://hopkins-abxguide.org> (free access)
Epocrates, <http://www.epocrates.com> (free and some sections require subscription)
Tarascon Pharmacopeia, <http://www.tarascon.com> (requires a subscription)
Davis Drug Guide for Physicians, <http://www.skyscape.com> (requires a subscription)
Thompson Micromedex, <http://www.micromedex.com> (requires a subscription)

STEPS = Safety, Tolerability, Effectiveness, Price, and Simplicity.

*—Inclusion of resources in this table does not represent an endorsement by the American Academy of Family Physicians.

just more than placebo. Physicians should be wary of the influence of the sample closet. Studies have shown that access to samples can influence choices independent of good clinical judgment.^{26,27}

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The Authors

MADELYN POLLOCK, M.D., is associate professor in the Department of Family Medicine at the University of Kansas Medical Center, Kansas City, and associate medical director for the Kansas Foundation for Medical Care in Topeka. She received her medical degree from the University of Texas Health Science Center at Houston. Dr. Pollock completed a family medicine residency at McLennan County Medical Education and Research Foundation and an academic medicine fellowship at the Faculty Development Center, both in Waco, Tex.

ORALIA V. BAZALDUA, PHARM.D., is associate professor and director of pharmacy education in the Family Medicine Residency Program at the University of Texas Health Science Center at San Antonio. She is a board-certified pharmacotherapy specialist and received her doctor of pharmacy degree from the University of Oklahoma College of Pharmacy in Oklahoma City. Dr. Bazaldua completed a primary care specialty residency at the

University of Colorado School of Pharmacy and at Kaiser Permanente, both in Denver.

ALISON E. DOBBIE, M.D., is the vice chair of and a professor in the Department of Family and Community Medicine at the University of Texas Southwestern Medical School at Dallas. She received her medical degree from the University of Glasgow in Scotland and completed her family medicine residency in Edinburgh, Scotland. Dr. Dobbie also completed a fellowship in academic medicine at the Faculty Development Center in Waco, Tex.

Address correspondence to Madelyn Pollock, M.D., University of Kansas Medical Center, Dept. of Family Medicine, 3901 Rainbow Blvd., MS# 4010, Kansas City, KS 66160 (e-mail: madelyn.pollock@gmail.com). Reprints are not available from the authors.

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