

CHAPTER

2

Prescriptions and Medication Orders

Jane F. Bowen, PharmD, BCPS

LEARNING OBJECTIVES

After successful completion of this chapter, the student should be able to:

1. Identify the components of a prescription and medication order
2. Verify that a prescriber's DEA number is correct
3. Interpret abbreviations and symbols that are commonly used in prescriptions and medication orders
4. Interpret prescriptions and medication orders to determine how they need to be prepared
5. Identify the components of a medication label
6. Calculate a patient's percent adherence to a prescribed regimen

KEY TERMS

DEA number

Institute for Safe Medication Practices (ISMP)

Joint Commission

Prescription and medication orders

2.1 INTRODUCTION AND DEFINITIONS

Prescriptions and medication orders are the primary means by which prescribers communicate with pharmacists regarding the desired treatment regimen for a patient. Prescriptions are used in the outpatient, or ambulatory, setting, whereas medication orders are used in the inpatient or institutional health system setting. Prescriptions and inpatient orders are legal orders that can be used for medications, devices, laboratory tests, procedures, and the like. The focus of this chapter is on prescriptions and orders for medications.

Prescriptions and medication orders can be handwritten, typed, preprinted, verbal, or entered into a computer program and submitted to the pharmacy by the patient or caregiver, or via fax, computer, or other electronic means. They can be for over-the-counter or legend (prescription) drugs. Unlike over-the-counter medications, which are determined by the U.S. Food and Drug Administration (FDA) to be safe and effective for use by the general public without a doctor's prescription, legend (prescription) drugs are to be used under the supervision of a licensed practitioner. Before dispensing the prescription or medication order, the pharmacist's responsibility is to evaluate the prescription or medication order for appropriateness. This includes ensuring the correct drug, dose and dosage form, frequency, route of

administration, duration of therapy, and indication. Additionally, the patient's profile is evaluated for therapeutic duplication, drug allergies, drug–disease state interactions, and drug–drug interactions, and laboratory data are reviewed, if available. This process helps ensure that the benefits of the therapy are maximized and the potential for harm is minimized.

2.2 BASICS OF PRESCRIPTIONS AND MEDICATION ORDERS

Although different states may vary slightly in their requirements for what information needs to be contained on a prescription, in general, it must contain the following information: name of the patient, drug name, drug strength, drug dosage form, quantity prescribed, directions for use, and the name, address, and signature of the prescriber. Additional information that may be included is the date of issue, number of refills authorized, address and/or date of birth of the patient, and prescriber's Drug Enforcement Administration (DEA) registration number. There are stricter regulations for prescriptions written for scheduled or controlled substances. Additional information would be present on a prescription for a pediatric patient, such as patient age and weight, or a prescription from a veterinarian, which would include the animal species. A sample prescription is shown in **Figure 2.1**.

Medication orders typically contain similar information that would be included on a prescription. This includes the patient's name and a secondary identifier such as the patient's date of birth, medical record number, or social security number (less commonly used now); the patient's location and room number; date and time of the order; the drug name, dose, route, frequency, and duration; and the prescriber's name and signature, as shown in **Figure 2.2**.

B. Pajamo, M.D. 4701 Main St. Baltimore, MD 12345	
Name <u>Jane Rusky</u>	DOB <u>1/5/62</u>
Address <u>309 South Street</u>	Date <u>8/10/14</u>
<p>R_x <i>Ciprofloxacin 500 mg</i> <i>Sig: take 1 tab po bid x 7 days</i> <i>Disp: 14 tabs</i></p>	
Refills <u>0</u>	<u>B. Pajamo</u> M.D.

FIGURE 2.1 Sample prescription

Patient: John Smith Age: 68		Medical record number: 145693 Room: 3B-154
Date	Medication	Prescriber
8/10 8:23 am	<i>Vancomycin 1,500 mg IV q12 hours x 3 days</i>	B. Pajamo, MD
	<i>D/c clindamycin 600 mg IV q6 hours</i>	B. Pajamo, MD
8/10 9:15 am	<i>KCl 20 mEq in 1 L 0.9%NS IV at 100 ml/hr x 1 liter</i>	B. Pajamo, MD
	<i>Acetaminophen 650 mg PO q6 hours prn temp >101°F</i>	B. Pajamo, MD

FIGURE 2.2 Sample medication order

Providers who prescribe controlled substances must register with the DEA to do so. They are provided with a DEA registration number that must be indicated on prescriptions and orders for controlled substances. The **DEA number** is a unique number that contains two letters and seven numbers. This number can be verified to help identify fraudulent registration numbers and prescriptions. Let's use DEA number AF1234563 as an example. For prescribers, the first character in their DEA number should be the letter A or B. For mid-level practitioners (i.e., physician's assistant [PA], nurse practitioner [NP], etc.), the first character is the letter M. The second character of the DEA number is the first letter of the prescriber's last name, unless, for example, the prescriber recently got married and changed their last name after receiving a DEA number. Our prescriber's last name should start with the letter F. The seven digits that follow the letters can be verified mathematically as well. First, add the odd numbers, the first, third, and fifth digits ($1 + 3 + 5 = 9$). Second, add the even numbers, the second, fourth, and sixth digits, and multiply the sum by 2 ($2 + 4 + 6 = 12$; $12 \times 2 = 24$). Finally, add the results from the first two steps ($9 + 24 = 33$). The far right digit of this number (3) should be the same as the seventh digit of the DEA number (3).

Test Yourself 2.2

Verify the following DEA registration numbers:

1.

B. Pajamo, M.D. 4701 Main St. Baltimore, MD 12345	
Name <i>Jane Rusky</i>	DOB <i>1/5/62</i>
Address <i>309 South Street</i>	Date <i>8/10/14</i>
<p>R_x <i>Oxycodone 5 mg</i> <i>Sig: take 1–2 tabs po q4–6h prn pain</i> <i>Disp: 30 tabs</i></p>	
Refills <i>0</i>	<i>B. Pajamo</i> M.D. DEA no. AP2426814

2.

B. Pajamo, M.D. 4701 Main St. Baltimore, MD 12345	
Name <i>John Smith</i>	DOB <i>6/7/44</i>
Address <i>51 Broadway Blvd.</i>	Date <i>8/10/14</i>
<p>R_x <i>Fentanyl patch 25 mcg/hr</i> <i>Sig: apply 1 patch q3 days</i> <i>Disp: 10 patches</i></p>	
Refills <i>0</i>	<i>B. Pajamo</i> M.D. DEA no. BP9637134

3. C. Roberts, N.P.
4701 Main St.
Baltimore, MD 12345

Name *Julie Woods* DOB 10/15/80
 Address 217 Central Ave. Date 8/10/14

R_x *Percocet 5/325 mg*
Sig: take 1 tab po q6h prn pain
Disp: 40 tabs

Refills 0 *C. Roberts* N.P.
DEA no. MR6839407

2.3 ABBREVIATIONS AND SYMBOLS COMMONLY USED IN PRESCRIPTIONS AND MEDICATION ORDERS

Abbreviations and symbols are common in prescriptions and medication orders. Although they may save time for the prescriber, they are sometimes a source of confusion and can be misinterpreted, resulting in medication errors. As a result, the **Joint Commission** (formerly the Joint Commission on Accreditation of Healthcare Organizations, or JCAHCO) requires healthcare organizations to develop an approach to standardizing abbreviations, acronyms, and symbols, as well as to create a list of those that should not be used. Commonly used abbreviations and symbols are listed in **Table 2.1**. The ones marked with an asterisk (*) have been identified by the Joint Commission and the **Institute for Safe Medication Practices (ISMP)** to be frequently misinterpreted and involved in harmful medication errors. ISMP has published a comprehensive list of symbols, abbreviations, and dose designations that lead to harmful medication errors called *ISMP's List of Error-Prone Abbreviations, Symbols, and Dose Designations*. The use of these should be avoided; however, they are still being used so their definitions need to be understood. Periods may or may not be present in between letters.

TABLE 2.1 Commonly used abbreviations in prescription writing, along with their definitions

Abbreviation	Definition	Abbreviation	Definition
aa	Affected area	BW	Body weight
a.c.	Before meals	C	Centigrade
ABW	Actual body weight	c or ċ	With
ad	Up to	cap	Capsule
a.d.*	Right ear	cc*	Cubic centimeter
a.m.	Morning	cr, crm	Cream
amp	Ampule	d	Day
APAP*	Acetaminophen	disc, D.C.*, d/c*	Discontinue
Aq	Water	disp	Dispense
a.s.*	Left ear	div	Divide
ASA	Aspirin	DOB	Date of birth
ATC	Around the clock	DS	Double strength
a.u.*	Each ear	d.t.d.	Give as such doses
b.i.d.	Twice a day	DW	Distilled water
b.i.w.	Twice a week	D5NS	Dextrose 5% in normal saline
BMI	Body mass index	D5½NS	Dextrose 5% in ½ normal saline (0.45% NaCl)
BSA	Body surface area	D5W	Dextrose 5% in water

TABLE 2.1 (continued)

Abbreviation	Definition	Abbreviation	Definition
EC	Enteric coated	OTC	Over the counter
elix.	Elixir	o.u.*	Each eye
e.m.p.	As directed	oz	Ounce
F	Fahrenheit	p or per	By
fl or fld	Fluid	p.c.	After meals
ft.	Make	PCN	Penicillin
g or Gm	Gram	p.m.	Afternoon or evening
gr	Grain	p.o.	By mouth
gtt, gtts	Drop, drops	post	After
h, hr, or °	Hour	PPM	Parts per million
HCTZ*	Hydrochlorothiazide	pr	Rectally
h.s.*	At bedtime	pre-op	Before surgery
IBW	Ideal body weight	p.r.n.	As needed
ID	Intradermal	pulv.	Powder
IM	Intramuscular	q	Every
inj.	Injection	q.d.*	Every day
IU*	International units	q.i.d.	Four times a day
IUD	Intrauterine device	q.o.d.*	Every other day
IV	Intravenous	q.s.	Sufficient quantity
IVP	Intravenous push	q.s. ad	A sufficient quantity to make
IVPB	Intravenous piggy back	s or s̄	Without
jt or j-tube	Jejunostomy tube	sc*, sq*, subq*, or subcut	Subcutaneous
KVO	Keep vein open	Sig.	Write on label
L	Liter	SL	Sublingual
LE	Lower extremities	sol.	Solution
LR	Lactated Ringer's injection	ss*	One half
M ² or m ²	Square meter	stat.	Immediately
mcg or µg*	Microgram	supp.	Suppository
MDI	Metered dose inhaler	susp.	Suspension
mEq	Milliequivalent	syr.	Syrup
mg	Milligram	tab	Tablet
min	Minute	tal. dos.	Such dose
ml or mL	Milliliter	tbsp.	Tablespoon
MOM	Milk of magnesia	t.i.d.	Three times a day
mOsm or mOsmol	Milliosmole	tinc	Tincture
MR	May repeat	t.i.w.*	Three times a week
MRX_	May repeat _ times	top	Topically
NG or NGT	Nasogastric or nasogastric tube	tsp.	Teaspoon
No. or no.	Number	U* or u*	Unit(s)
noct.	Night	u.d.* or utdict	As directed
non rep. or N.R.	Do not repeat or no refills	UE	Upper extremities
NPO	Nothing by mouth	ung.	Ointment
NS	Normal saline (0.9% NaCl)	vag.	Vaginally
½ NS	Half-strength normal saline (0.45% NaCl)	vol.	Volume
NTG	Nitroglycerin	w/	With
o.d.*	Right eye	w.a.	While awake
oint.	Ointment	w/o	Without
o.s.*	Left eye	x	Times

Data from: Thompson JE. *A Practical Guide to Contemporary Pharmacy Practice*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.

In addition to commonly used abbreviations that should be avoided because of the potential for misinterpretation, ISMP suggests the following when writing numbers for doses on a prescription:

- *Do not use trailing zeros for doses expressed as whole numbers.* If the dose on a prescription is 1 milligram, it should be written as “1 mg” and not “1.0 mg”. The decimal point could be missed, and the strength could be misinterpreted as 10 milligrams.
- *Use a zero before a decimal point when the dose is less than a whole unit.* If the dose on a prescription is one half milligram, it should be written as “0.5 mg” and not “.5 mg”. The decimal point before the number could be missed, and the strength could be misinterpreted as 5 milligrams.
- *Use commas for dosing units at or above 1,000 or use words such as “100 thousand” or “1 million” to improve readability.* If the dose on a prescription is ten thousand units, it should be written as “10,000 units” or “10 thousand units” and not “10000 units”. The incorrect number of zeros could be miscounted and misinterpreted as the wrong strength.
- *Place adequate space between the dose and unit of measure.* If the dose on a prescription is ten milligrams, it should be written as “10 mg” and not “10mg”. The lack of space between the dose and strength makes the numbers and letters run together and could be misinterpreted as additional numbers.
- *Place adequate space between the drug name, dose, and unit of measure.* If the prescription is for Tegretol 300 milligrams, it should be written as “Tegretol 300 mg” and not “Tegretol300mg” or “Tegretol300 mg.” The lack of space between the drug name and strength makes the numbers run together and could be interpreted as Tegretol 1,300 milligrams.

≡ Test Yourself 2.3

1. Interpret the following directions that would be written on a prescription:
 - a. Instill 2 gtts o.u. bid × 7 days
 - b. Take 1–2 tabs p.o. q4h prn pain
 - c. Apply crm top to aa qid prn itchiness
 - d. Take 1 cap po pc
 - e. Give 5 mL NGT qd
 - f. Take 1 tab po qod prn LE swelling
 - g. Disp 12 mL and qs ad to 15 mL
 - h. Give 50 mcg IVP q5min prn agitation
 - i. Use 1 supp pr qd prn constipation
 - j. Inhale 2 puffs via MDI bid qam and hs
 - k. Instill 1 gtt a.s. q2h ATC wa ud
 - l. Ft IVPB of potassium chloride 20 mEq in 250 mL NS
 - m. Inject 10 u SQ ac
 - n. Take Bactrim DS tab po bid \bar{c} plenty of fluids
 - o. Give ss tbsp susp stat
2. Please write out the following drugs, strengths, and units as they should appear on a prescription:
 - a. Clonidine one tenth milligram
 - b. Lisinopril twenty milligrams
 - c. Penicillin 1 million 2 hundred thousand units
 - d. Tamsulosin four tenths milligram

2.4 LABELING PRESCRIPTIONS AND MEDICATION ORDERS

The federal Food, Drug, and Cosmetic Act requires that an outpatient prescription label must contain at least the following information: name of the patient, prescription number, date when the prescription was written and/or dispensed, directions for use, name of the prescriber, name and address of the pharmacy, and any appropriate cautionary statements.

Additional information that is usually present on the label includes the medication name (proprietary and/or generic), dosage form, and strength; name or initials of the dispensing pharmacist; name of the manufacturer; beyond use date; quantity dispensed; and number of refills. Prescriptions for controlled substances should also have an auxiliary label that reads, "Caution: Federal law prohibits the transfer of this drug to any person other than the patient for whom it was prescribed." Please refer to individual state regulations to determine the information required in your state. A sample outpatient prescription label is shown in **Figure 2.3**.

Labeling of medications in the institutional setting may vary depending on whether the final product being labeled is a single dose of a medication or a multiple dose container, as well as the route via which the medication is to be administered. Because these products are not dispensed to the end user, the information contained on the label is slightly different from a prescription label of a medication being dispensed to the patient. Inpatient medication labels usually contain the following information: patient's name and another patient identifier (location, medical record number, etc.), all drug and solution names, route of administration, strength and volume of the product(s), directions for administration, date and time prepared, expiration date, control or lot number for batch-prepared items, appropriate auxiliary labels, storage requirements, and the identification of the person preparing and checking the product. Because more facilities are implementing barcode technology to reduce medication errors, barcodes may be present on the medication label, like the one shown in **Figure 2.4**.

Agarbow Pharmacy 284 Mulver Lane Baltimore, MD 12345	
Name <u>John Smith</u>	Date <u>9/22/14</u>
Rx: 398572 Metoprolol succinate Extended Release Tablets 50 mg (generic for Toprol XL) Take one tablet by mouth once daily	
Qty <u>60</u>	<u>B. Pajamo</u> M.D.
Refills <u>3</u>	<u>JFB</u> Pharmacist
Discard after: <u>9/22/15</u>	

FIGURE 2.3 Sample outpatient prescription label


Agarbow Medical Center 284 Mulver Lane Baltimore, MD 12345		
Name <u>Jacob Green</u>	Room <u>5A-109</u>	
Piperacillin/tazobactam 4.5 grams in D5W 250 mL		
Administer IV every 6 hours Infuse over 30 minutes At 8 mL/min		
Refrigerate	Checked by: JFB	
Prepared: 7/6/14 at 7.30 am by CM		

FIGURE 2.4 Sample medication label for intravenous product

☰ Test Yourself 2.4

Can you identify what abbreviations were misinterpreted in these prescription and label combinations?


1.

B. Pajamo, M.D. 4701 Main St. Baltimore, MD 12345	
Name <i>Jacob Green</i>	DOB <i>3/30/42</i>
Address <i>25 South Street</i>	Date <i>8/10/14</i>
<p>R_X <i>Lantus insulin</i> <i>Sig: inj. 10u scq.d</i> <i>Disp: 1 vial</i></p>	
Refills <i>3</i>	<i>B. Pajamo</i> M.D.

Agarbow Pharmacy 284 Mulver Lane Baltimore, MD 12345	
Name <u>Jacob Green</u>	Date <u>8/10/14</u>
<p>Rx: 398572 Lantus insulin injection Inject 100 units subcutaneously four times a day</p>	
Qty <u>1 vial</u>	<u>B. Pajamo</u> M.D.
Refills <u>3</u>	<u>JFB</u> Pharmacist
Discard after: <u>28 days after opening</u>	

2.

Patient: John Smith		Medical record number: 145693
Age: 68		Room: 3B-154
Date	Medication	Prescriber
<i>8/10 8:23 am</i>	<i>Heparin 5,000 units subq 2 hours before surgery</i>	<i>M. Feelgood, MD</i>

Agarbow Medical Center 284 Mulver Lane Baltimore, MD 12345		
Name <u>John Smith</u>	Room <u>3B-154</u>	
Heparin 5,000 units		
Administer subcutaneously every 2 hours before surgery		
Prepared: 7/6/14 at 7:30 am by CM	Checked by: <u>JFB</u>	
Discard after: 8/6/14 at 7:30 am	Prescriber: <u>Dr. M. Feelgood</u>	

3.

B. Pajamo, M.D. 4701 Main St. Baltimore, MD 12345	
Name <u>Jane Rusky</u>	DOB <u>1/5/62</u>
Address <u>309 South Street</u>	Date <u>8/10/14</u>
<div style="font-size: 2em; font-weight: bold; margin-bottom: 5px;">Rx</div> Synthroid 50 µg Sig: <i>i tab po qam</i> Disp: 90 tabs	
Refills <u>2</u>	<u>B. Pajamo</u> M.D.

Agarbow Pharmacy 284 Mulver Lane Baltimore, MD 12345	
Name <u>Jane Rusky</u>	Date <u>8/10/14</u>
<div style="font-size: 2em; font-weight: bold; margin-bottom: 5px;">Rx</div> 398573 Levothyroxine tablets 50 mg (Generic for Synthroid) Take 1 tablet by mouth every morning	
Qty <u>90</u>	<u>B. Pajamo</u> M.D.
Refills <u>2</u>	<u>JFB</u> Pharmacist
Discard after: <u>8/10/15</u>	

2.5 CALCULATING PERCENT ADHERENCE

According to the World Health Organization (WHO), adherence is defined as “the extent to which a person’s behavior—taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider.” With regard to medications, nonadherent behaviors include missing doses, taking drug holidays, taking extra doses when not feeling well, changing the timing of doses, or inconsistently taking medication. There are many reasons patients may be nonadherent to a prescribed regimen, including unclear or complex instructions, treatment of asymptomatic disease, side effects of medications, presence of cognitive impairment, inadequate follow-up or discharge planning, patient’s lack of belief in the benefit of the treatment, poor insight into the illness, poor provider–patient relationship, cost of the medication, presence of barriers to medical care or medications, as well as many others. These behaviors have negative consequences, including disease progression from inadequate treatment, increased complications, reduced patient functioning, lower quality of life, adverse events, resistance, withdrawal, and an increased cost to the healthcare system due to all of these effects.

Many tools can be used to assess a person’s adherence to their prescribed medication regimen, all of which have pros and cons. One way is to calculate the person’s rate of adherence by dividing the expected days supply of the medication by the actual days supply and multiplying the quotient by 100.

$$\text{Percent adherence} = \frac{\text{Expected days supply}}{\text{Actual days supply}} \times 100$$

It is important to remember that this method can be influenced by many factors. For example, the patient may have had medication left over from a previous refill or from being filled at another pharmacy, received samples from the doctor, been hospitalized and therefore hadn’t been taking the home supply of medication, and so on. It is therefore important to assess many other pieces of information prior to determining the patient’s true adherence.

Solved Examples

1.

B. Pajamo, M.D. 4701 Main St. Baltimore, MD 12345	
Name <i>Jacob Green</i>	DOB <i>3/30/42</i>
Address <i>25 South Street</i>	Date <i>8/10/14</i>
<div style="font-size: 2em; font-weight: bold; margin-bottom: 5px;">R_X</div> <i>Captopril 12.5 mg</i> <i>Sig: take 1 tab po TID</i> <i>Disp: 270 tabs</i>	
Refills <u>1</u>	<i>B. Pajamo</i> M.D.

If this prescription was filled on 8/10, how long will this fill last and when should Jacob be back for a refill?

The instructions on the prescription say to take 1 tablet by mouth three times a day.

$$\frac{270 \text{ tabs}}{3 \text{ tabs/day}} = 90 \text{ days}$$

The filled prescription should last 90 days, and Jacob should be back in about 3 months for a refill. This should be around 11/10.

2. If Jacob comes back after 110 days for the next refill, what is his percent adherence?

$$\frac{90 \text{ days}}{110 \text{ days}} \times 100 = 81.8\% \text{ adherence}$$

Test Yourself 2.5

1.

B. Pajamo, M.D. 4701 Main St. Baltimore, MD 12345	
Name <i>Charlie Williams</i>	DOB <i>6/14/72</i>
Address <i>964 Chestnut Street</i>	Date <i>10/9/14</i>
<p>R_X <i>Simvastatin 40 mg</i> <i>Sig: take 1 tabl po qd</i> <i>Disp: 90 tabs</i></p>	
Refills <u>1</u>	<i>B. Pajamo</i> M.D.

If Charlie comes back for a refill in 97 days, what is his percent adherence?

2.

B. Pajamo, M.D. 4701 Main St. Baltimore, MD 12345	
Name <i>Julie Woods</i>	DOB <i>10/15/80</i>
Address <i>217 Central Ave.</i>	Date <i>5/17/14</i>
<p>R_X <i>Phenytoin 125 mg/5 mL oral</i> <i>suspension</i> <i>Sig: take 100 mg (4 mL) po TID</i> <i>Disp: 240 mL</i></p>	
Refills <u>5</u>	<i>B. Pajamo</i> M.D.

If Julie comes back for a refill in 30 days, what is her percent adherence?

3.

B. Pajamo, M.D. 4701 Main St. Baltimore, MD 12345	
Name <i>John Smith</i>	DOB <i>6/7/44</i>
Address <i>51 Broadway Blvd</i>	Date <i>2/1/14</i>
<p>R_X <i>Novolog</i> <i>Sig: inject 10 units subcut before</i> <i>breakfast, 15 units before lunch,</i> <i>and 20 units before dinner</i> <i>Disp: 1 vial</i></p>	
Refills <u>11</u>	<i>B. Pajamo</i> M.D.

If 1 vial of Novolog contains 100 units/mL of insulin and the vial size is 10 mL, what is John's percent adherence if he returns for a refill in 28 days?

ANSWERS TO TEST YOURSELF

Test Yourself 2.2

1. The prescriber is an MD; therefore, the first letter of the DEA number should be an A or a B. The second letter of the DEA number is P, the first letter of the prescriber's last name, which is correct. For the remaining numbers
 - Add the odd digits (the first, third, and fifth digits): $2 + 2 + 8 = 12$.
 - Add the even digits (the second, fourth, and sixth digits), and then multiply by 2:
 $4 + 6 + 1 = 11$, $11 \times 2 = 22$.
 - Add the two numbers: $12 + 22 = 34$.
 - The last digit of this number (4) is the same as the last digit of the DEA number (4). Therefore, this DEA number is correct.
2. The prescriber is an MD; therefore, the first letter of the DEA number should be an A or a B. The second letter of the DEA number is F, the first letter of the prescriber's last name, which is correct. For the remaining numbers
 - Add the odd digits (the first, third, and fifth digits): $9 + 3 + 1 = 13$.
 - Add the even digits (the second, fourth, and sixth digits), and then multiply by 2:
 $6 + 7 + 3 = 16$, $16 \times 2 = 32$.
 - Add the two numbers: $13 + 32 = 45$.
 - The last digit of this number (5) is not the same as the last digit of the DEA number (4). Therefore, this DEA number is incorrect.
3. The prescriber is a nurse practitioner; therefore, the first letter of the DEA number should be M. The second letter of the DEA number is R, the first letter of the prescriber's last name, which is correct. For the remaining numbers
 - Add the odd digits (the first, third, and fifth digits): $6 + 3 + 4 = 13$.
 - Add the even digits (the second, fourth, and sixth digits), and then multiply by 2:
 $8 + 9 + 0 = 17$, $17 \times 2 = 34$.
 - Add the two numbers: $13 + 34 = 47$.
 - The last digit of this number (7) is the same as the last digit of the DEA number (7). Therefore, this DEA number is correct.

Test Yourself 2.3

1.
 - a. Instill 2 drops into each eye twice daily times 7 days.
 - b. Take 1–2 tablets by mouth every 4 hours as needed for pain.
 - c. Apply cream topically to affected area 4 times a day as needed for itchiness.
 - d. Take 1 capsule by mouth after meals.
 - e. Give 5 milliliters via nasogastric tube every day.
 - f. Take 1 tablet by mouth every other day as needed for lower extremity swelling.
 - g. Dispense 12 milliliters and add a sufficient quantity to make 15 mL.
 - h. Give 50 micrograms by intravenous push every 5 minutes as needed for agitation.
 - i. Use 1 suppository rectally every day as needed for constipation.
 - j. Inhale 2 puffs via metered dose inhaler twice a day every morning and at bedtime.
 - k. Instill 1 drop in the left ear every 2 hours around the clock while awake as directed.
 - l. Make an intravenous piggyback of potassium chloride 20 milliequivalents in 250 milliliters of normal saline.
 - m. Inject 10 units subcutaneously before meals.
 - n. Take Bactrim double strength tablet by mouth twice a day with plenty of fluids.
 - o. Give one half tablespoon of suspension immediately.
2.
 - a. Clonidine 0.1 mg
 - b. Lisinopril 20 mg

- c. Penicillin 1.2 million units or Penicillin 1,200,000 units
 d. Tamsulosin 0.4 mg

Test Yourself 2.4

1. The “u” following the number 10 was interpreted as a *0*, instead of a *u* representing units. Also, the period after “q” was misinterpreted as an *i* and read as “qid” instead of “q.d.” These are commonly misinterpreted abbreviations. To prevent this error, the word “units” should be spelled out and “q.d.” should be written as “daily.”
2. The “q” in “subq” was interpreted as *every* instead of as part of the *subq* abbreviation to mean subcutaneously. To prevent this error, the word “subcut” or “subcutaneously” should be spelled out.
3. The “μ” in “μg” was misinterpreted as an *m*, and therefore the patient is receiving 50 mg instead of 50 mcg. To prevent this error, “mcg” should be used to represent micrograms.

Test Yourself 2.5

$$1. \frac{90 \text{ days}}{97 \text{ days}} \times 100 = 92.8\% \text{ adherence}$$

$$2. \frac{4 \text{ mL}}{\text{dose}} \times \frac{3 \text{ doses}}{\text{day}} = 12 \text{ mL per day}$$

$$\frac{240 \text{ mL}}{12 \text{ mL per day}} = 20 \text{ days}$$

A 240-mL bottle of phenytoin should last Julie for 20 days.

$$\frac{20 \text{ days}}{30 \text{ days}} \times 100 = 66.7\% \text{ adherence}$$

3. 10 units + 15 units + 20 units = 45 units per day

$$\frac{10 \text{ mL}}{\text{mL}} \times \frac{100 \text{ units}}{\text{mL}} = 1,000 \text{ units of insulin per vial}$$

$$\frac{1000 \text{ units}}{45 \text{ units per day}} = 22.2 \text{ days}$$

1 vial of insulin should last John for about 22 days.

$$\frac{22 \text{ days}}{28 \text{ days}} \times 100 = 78.6\% \text{ adherence}$$

REFERENCES

1. World Health Organization. *Adherence to Long-Term Therapies: Evidence for Action*. Geneva, Switzerland: Author; 2003.
2. Institute for Safe Medication Practices. *ISMP's list of error-prone abbreviations, symbols, and dose designations*. 2012. Available at: <http://www.ismp.org/Tools/errorproneabbreviations.pdf>. Accessed August 13, 2012.
3. Osterberg L, Blaschke T. Adherence to medication. *N Engl J Med*. 2005;353(5):487–497.
4. Thompson JE. *A Practical Guide to Contemporary Pharmacy Practice*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.

