CHAPTER FOUR: INTERPRETATION OF PRESCRIPTIONS AND MEDICATION ORDERS

Objectives

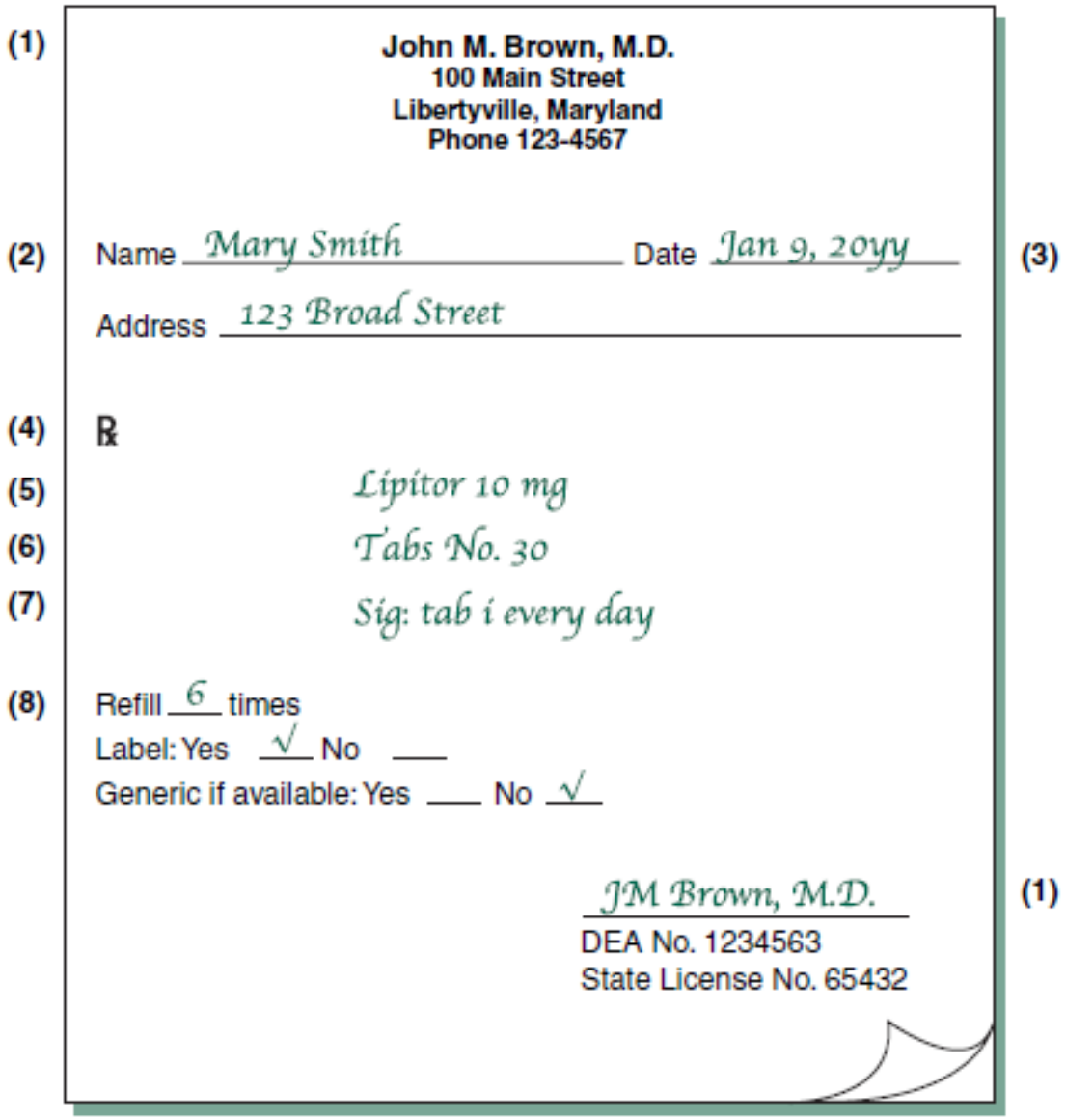
- Demonstrate an understanding of the format and components of a typical prescription.
- Demonstrate an understanding of the format and components of a typical institutional medication order.
- • Interpret correctly standard abbreviations and symbols used on prescriptions and medication orders.
- • *patient adherence calculations*

- By definition, a ***prescription*** is an order for medication issued by a physician, dentist, or other properly licensed medical practitioner.

- A prescription designates a specific medication and dosage to be prepared by a pharmacist and administered to a particular patient.

Components of a typical prescription

- (1) Prescriber information and signature
- (2) Patient information
- (3) Date prescription was written
- (4) symbol (the Superscription), meaning ‘‘take thou,’’
- ‘‘you take,’’ or ‘‘recipe’’ Rx
- (5) Medication prescribed (the Inscription)
- (6) Dispensing instructions to the pharmacist (the Subscription)
- (7) Directions to the patient (the Signa)
- (8) Special instructions. It is important to note that for any Medicaid or Medicare prescription and according to individual state laws, a handwritten language by the prescriber, such as ‘‘Brand necessary,’’ may be required to disallow generic substitution.



(1)

John M. Brown, M.D.
100 Main Street
Libertyville, Maryland
Phone 123-4567

(2) Name Mary Smith Date Jan 9, 20yy (3)

Address 123 Broad Street

(4) ℞

(5) Lipitor 10 mg

(6) Tabs No. 30

(7) Sig: tab i every day

(8) Refill 6 times
Label: Yes √ No ___
Generic if available: Yes ___ No √

JM Brown, M.D. (1)
DEA No. 1234563
State License No. 65432

- In hospitals and other institutions, the forms are somewhat different and are referred to as ***medication orders.*** A typical medication order sheet is shown in Figure 4.2.

CITY HOSPITAL
Athens, GA 30600

PATIENT NAME:	Thompson, Linda
ADDRESS:	2345 Oak Circle
CITY, STATE:	Athens, GA
AGE/SEX:	35 Female
PHYSICIAN:	J. Hardmer
HOSP.NO:	900612345
SERVICE:	Medicine
ROOM:	220 East

PHYSICIAN'S ORDER

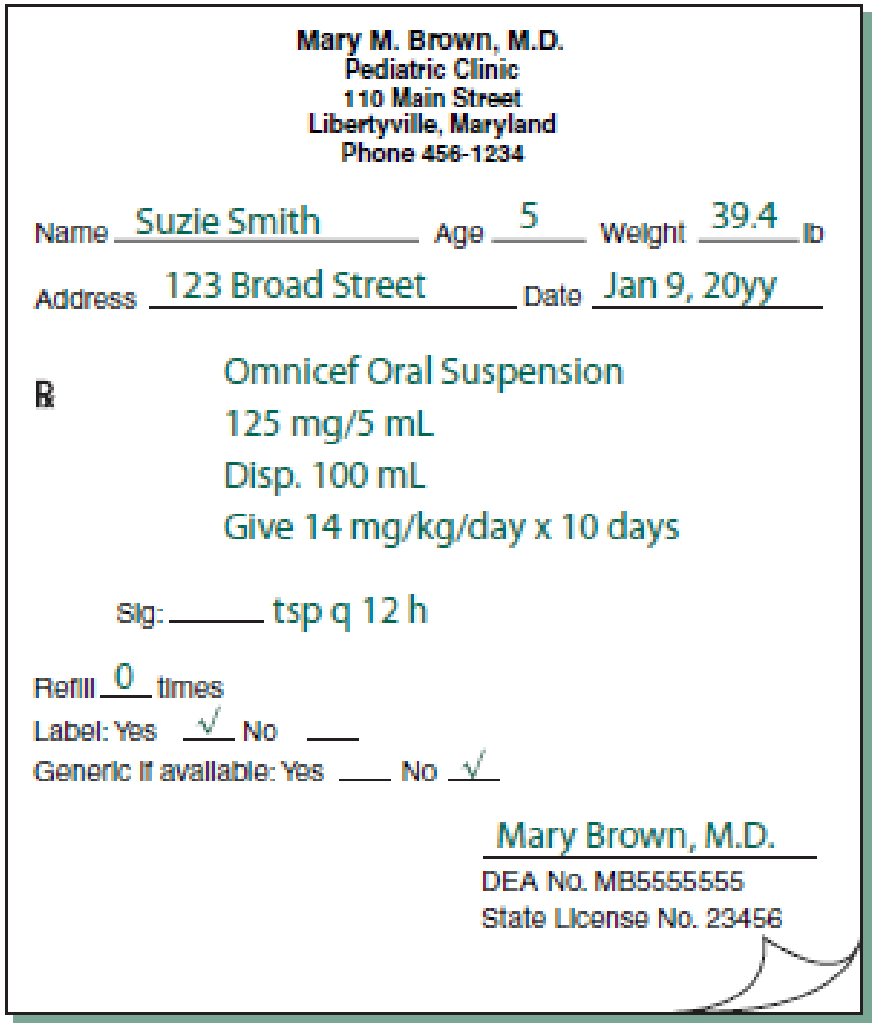
DATE	TIME	ORDERS
02/01/yy	1200	1. Propranolol 40 mg po QID
		2. Furosemide 20 mg po q AM
		3. Flurazepam 30 mg at HS prn sleep
		4. D-5-W + 20 mEq kcl/L at 84 mL/hr
		Hardmer, MD

Unless "No substitution permitted" is clearly written after the order, a generic or therapeutic equivalent drug may be dispensed according to the Formulary policies of this hospital.

FIGURE 4.2 Typical hospital medication order sheet.

- A prescription or medication order for an infant, child, or an elderly person may also include the age, weight, and/or body surface area (BSA) of the patient

- An example of a prescription written for a pediatric patient is shown in Figure 4.3. This information
- is sometimes necessary in calculating the appropriate medication dosage.



Mary M. Brown, M.D.
Pediatric Clinic
110 Main Street
Libertyville, Maryland
Phone 456-1234

Name Suzie Smith Age 5 Weight 39.4 lb

Address 123 Broad Street Date Jan 9, 20yy

℞ Omnicef Oral Suspension
125 mg/5 mL
Disp. 100 mL
Give 14 mg/kg/day x 10 days

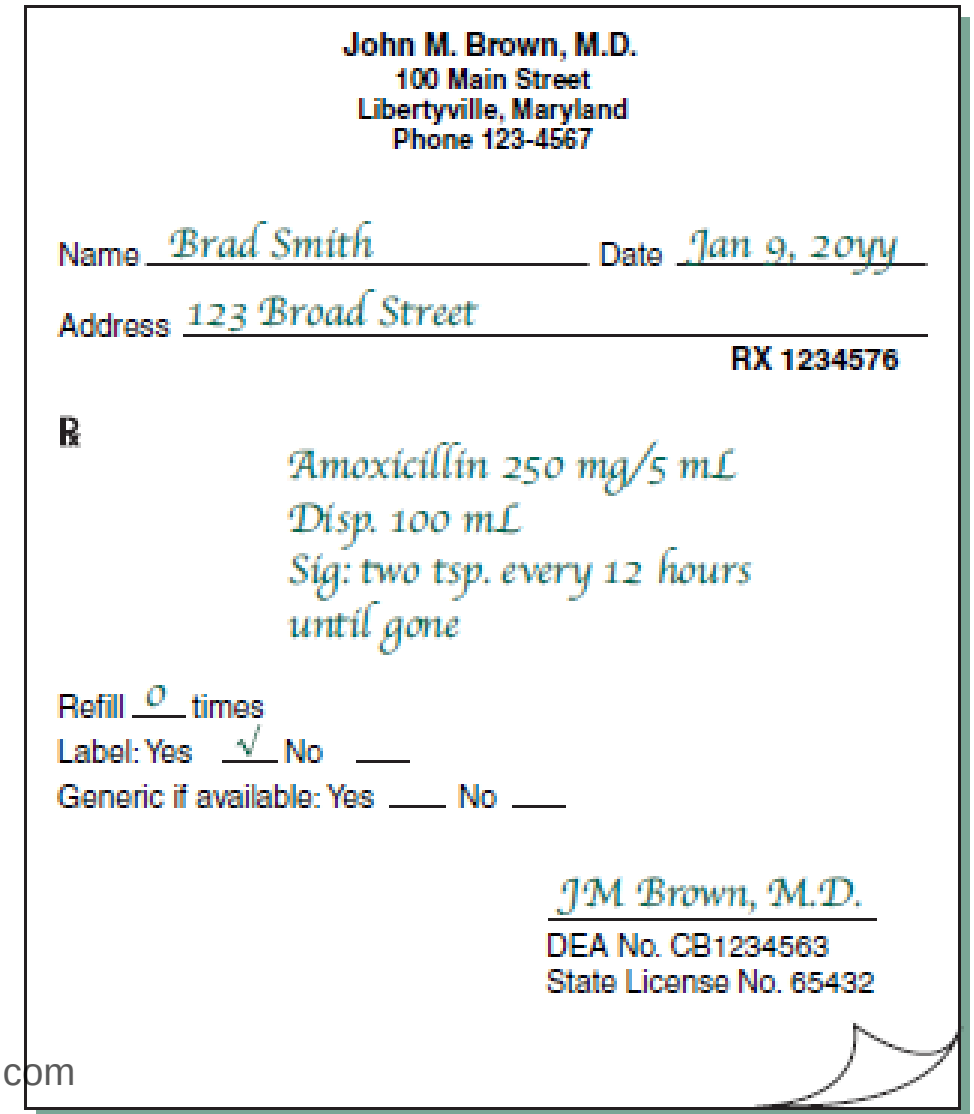
Sig: ____ tsp q 12 h

Refill 0 times
Label: Yes √ No ____
Generic if available: Yes ____ No √

Mary Brown, M.D.
DEA No. MB5555555
State License No. 23456

FIGURE 4.3 Example of a prescription for a pediatric patient.

Generic drug



John M. Brown, M.D.
100 Main Street
Libertyville, Maryland
Phone 123-4567

Name Brad Smith Date Jan 9, 20yy

Address 123 Broad Street

RX 1234576

℞

Amoxicillin 250 mg/5 mL
Disp. 100 mL
Sig: two tsp. every 12 hours
until gone

Refill 0 times
Label: Yes √ No ___
Generic if available: Yes ___ No ___

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DEA No. CB1234563
State License No. 65432

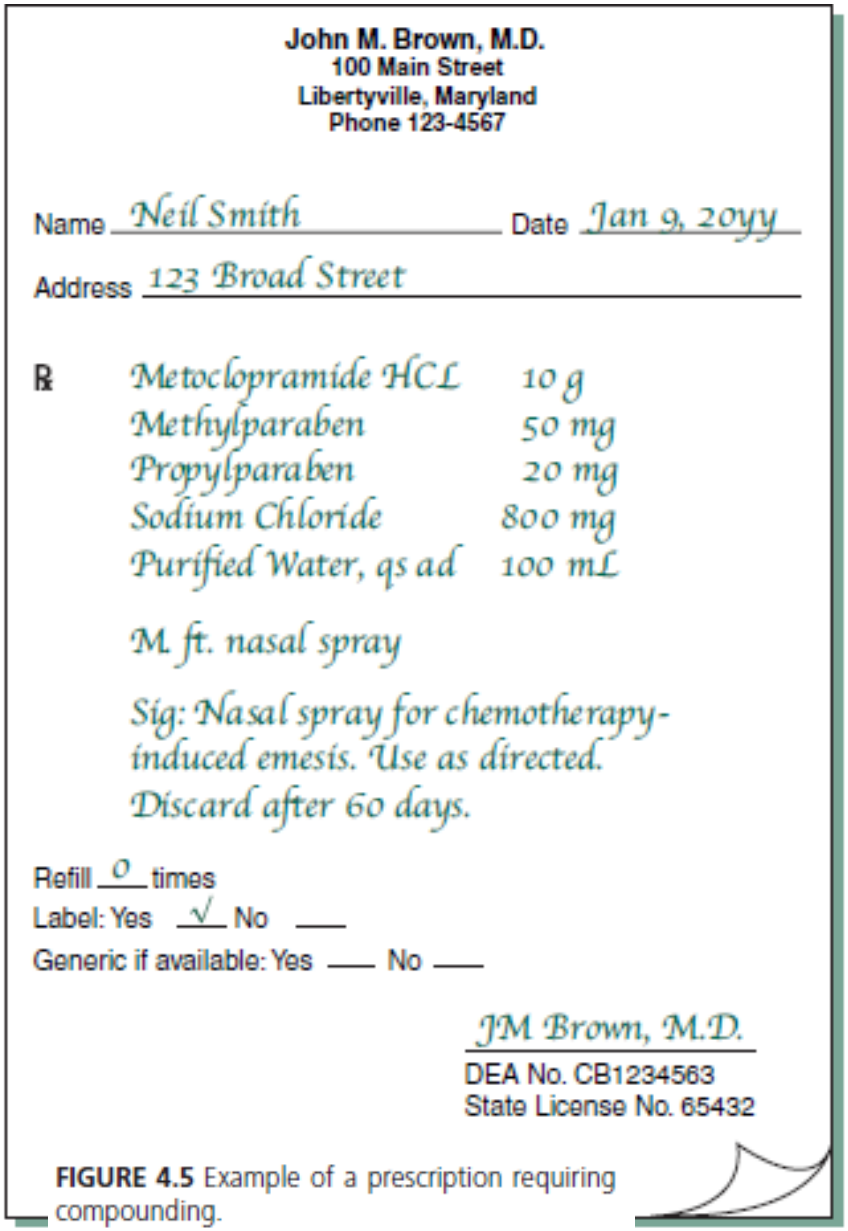
- It is important to recognize two broad categories of prescriptions:

- (1) those written for a single component or prefabricated product and *not requiring compounding* or admixture by
- the pharmacist, and

- (2) those written for more than a single component and *requiring compounding*

extemporaneous compounding

- The extemporaneous compounding of prescriptions is an activity for which pharmacists are uniquely qualified by virtue of their education, training, and experience.
- By definition, ***pharmacy compounding*** involves the
  - mixing,
  - assembling,
  - packaging, and
  - labeling of
- a medication on receipt of a prescription order for a specific patient.



John M. Brown, M.D.
100 Main Street
Libertyville, Maryland
Phone 123-4567

Name Neil Smith Date Jan 9, 20yy

Address 123 Broad Street

℞

Metoclopramide HCL	10 g
Methylparaben	50 mg
Propylparaben	20 mg
Sodium Chloride	800 mg
Purified Water, qs ad	100 mL

M. ft. nasal spray

Sig: Nasal spray for chemotherapy-induced emesis. Use as directed. Discard after 60 days.

Refill 0 times
Label: Yes √ No ___
Generic if available: Yes ___ No ___

JM Brown, M.D.
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FIGURE 4.5 Example of a prescription requiring compounding.

e-prescribing/e-prescriptions

- In the inpatient or outpatient setting, a medication order, for a patient is entered into an automated data entry system as a personal computer (PC) or a handheld
- device loaded with ***e-prescribing*** software and sent to a pharmacy as an ***e-prescription***.

- When received, a pharmacist immediately reduces the order to a hard copy and/or stores it as a computer
- file.

- Among the advantages cited for *e-prescriptions* over traditional paper prescriptions are:
  - Reduced errors due to prescription legibility;
  - concurrent software screens for drug interactions;
  - reduced incidence of altered or forged prescriptions;
  - efficiency for both prescriber and pharmacist; and,
  - convenience to the patient, whose prescription would likely be ready for pick-up upon arrival at the pharmacy

Range of Prescription and Medication Order Calculations

- *calculations of the following:*
  - *Doses:* including the quantity of a prescribed dose, the total number of doses prescribed, and the number of days the prescribed medication will last.
  - *Adherence:* the patient's or caregiver's Adherence in meeting the prescribed directions for dosing. *Drug concentration:* the quantity of an active therapeutic ingredient to use to achieve the desired drug concentration.
  - *Rate of drug administration:* the quantity of drug administered per unit of time to meet prescribed dosing schedule
  - *Compounding:* the quantities of active and inactive components to use in the extemporaneous preparation of a pharmaceutical product, including the use of stock solutions and/or prefabricated dosage units in the process.
  - *Chemical-physical factors:* including calculations to make solutions isotonic, iso-osmotic, equimolar, or buffered.
  - •*Pharmacoeconomics:* including medication costs, cost-benefit analysis, cost-effectiveness analysis, alternative treatment plans, and medication pricing.

- The quantities of ingredients to be used almost always are expressed in SI metric units of weight and measurement.

Examples of prescriptions written in SI metric units:

℞	Acetylsalicylic Acid	4 g
	Phenacetin	0.8 g
	Codeine Sulfate	0.5 g
	Mix and make capsules no. 20	
	Sig. One capsule every 4 hours.	

Prescription and Medication Order Accuracy

- It is pharmacists responsibility that each medication should be:
  - • therapeutically appropriate for the patient;
  - • prescribed at the correct dose;
  - • dispensed in the correct strength and dosage form;
  - • correctly labeled with complete instructions for the patient or caregiver; and
  - • for the patient in a hospital or other health care facility, each medication must be administered
  - ➢ to the correct patient, at the correct time, and by the correct rate and route of administration.

Use of Roman Numerals on Prescriptions

ss	=	½	L or l	=	50
I, i, or j	=	1	C or c	=	100
V or v	=	5	D or d	=	500
X or x	=	10	M or m	=	1000

- 1. A letter repeated once or more, repeats its value (e.g., xx 20; xxx 30).
- 2. One or more letters placed *after* a letter of greater value *increases* the value of the greater letter (e.g., vi 6; xij 12; lx 60).
- 3. A letter placed *before* a letter of greater value *decreases* the value of the greater letter (e.g., iv
- 4; xl 40).
- When Roman numerals are used, the tradition of placing the numerals after the term or
- symbol generally is followed (e.g., capsules no. xxiv; fluidounces xij).

Use of Abbreviations and Symbols

TABLE 4.2 SELECTED ABBREVIATIONS, ACRONYMS, AND SYMBOLS USED IN PRESCRIPTIONS AND MEDICATION ORDERS[a,b]

ABBREVIATION (LATIN ORIGIN[c])	MEANING
Prescription Filling Directions	
aa. or (*ana*)	of each
ad *(ad)*	*up to; to make*
disp. (dispensatur)	*dispense*
div. (*dividatur*)	divide
d.t.d. (*dentur tales* doses)	give of such doses
ft (*fiat*)	make
M. (*mice*)	mix
No. (*numero*)	number
non rep. or NR (non repatatur)	*do not repeat*
q.s. (quantum sufficit)	a sufficient quantity
q.s. ad (quantum sufficiat ad)	*a sufficient quantity to make*
Sig. (Signa)	write (directions on label)
pt.	pint
qt.	quart
ss or $\overline{ss}$ (*semissem*	one half
tbsp.	tablespoonful
tsp.	*teaspoonful*
Signa/Patient Instructions	
a.c. (ante cibos)	*before meals*
ad lib. (*ad libitum*)	at pleasure, freely
admin	administer
A.M. (*ante meridiem*)	morning
aq. (*aqua*)	water
ATC	around the clock
b.i.d. (bis in die)	*twice a day*
c or $\overline{c}$ (*cum*)	*with*
d (die)	*day*
dil. (*dilutus*)	dilute
et	and

Quantities and Measurement

BSA	body surface area
cm^3	cubic centimeter or milliliter (mL)
f or fl (fluidus)	fluid
$fl\bar{3}$ or $f\bar{3}$	fluid dram (≅ teaspoonful, 5 mL)
$fl\bar{3}ss$ or $f\bar{3}ss$	half-fluidounce (≅ tablespoonful, 15mL)
g	*gram*
gal	gallon
gtt (*gutta*)	drop
lb (*libra*)	pound
kg	kilogram
L	liter
m^2 or M^2	square meter
mcg	microgram
mEq	milliequivalent
mg	*milligram*
mg/kg	milligrams (of drug) per kilogram (of body weight)
mg/m^2	milligrams (of drug) per square meter (of body surface area)
mL	*milliliter*
mL/h	milliliters (of drug administered) per hour (as through intravenous administration)
mOsm or mOsmol	milliosmoles
oz.	*ounce*
h. or hr. (hora)	*hour*
h.s. (hora somni)	*at bedtime*
i.c. (*inter cibos*)	between meals
min. (*minutum*)	minute
m&n	morning and night
N&V	nausea and vomiting
noct. (*nocte*)	night
NPO (*non per os*)	nothing by mouth
p.c. (post cibos)	*after meals*
P.M. (post meridiem)	*afternoon; evening*
p.o. (per os)	*by mouth (orally)*
p.r.n. (pro re nata)	*as needed*
q (quaque)	*every*
qAM	*every morning*
q4h, q8h, etc.	*every __ hours*
q.i.d. (quarter in die)	*four times a day*
rep. (*repetatur*)	repeat
s (*sine*)	without
s.i.d. (*semel in die*)	once a day
s.o.s. (si opus sit)	if there is need; as needed
stat. (statim)	*immediately*
t.i.d. (ter in die)	three times a day
ut dict. (*ut dictum*)	as directed
wk.	week

Medications

APAP	acetaminophen
ASA	aspirin
AZT	zidovudine

TABLE 4.2 *Continued*

ABBREVIATION (LATIN ORIGIN[c])	MEANING	ABBREVIATION (LATIN ORIGIN[c])	MEANING
EES	erythromycin ethylsuccinate	D5NS	dextrose 5% in normal saline (0.9% sodium chloride)
HC	hydrocortisone		
HCTZ	hydrochlorothiazide	D5W	dextrose 5% in water
MTX	methotrexate	D10W	dextrose 10% in water
NTG	nitroglycerin	elix.	elixir
Clinical		inj.	injection
BM	bowel movement	NS	normal saline
BP	blood preasure	½NS	half-strength normal saline
BS	blood sugar		
CHD	coronary heart disease	*oint or ungt.* (unguentum)	*ointment*
CHF	congestive heart failure	pulv. (*pulvis*)	powder
GERD	gastrointestinal reflux disease	RL, R/L or LR	Ringer's Lactate or Lactated Ringer's
GI	gastrointestinal	sol. (solutio)	*solution*
GFR	glomerular filtration rate	*supp.* (suppositorium)	*suppository*
GU	genitourinary		
HA	headache	*susp.*	*suspension*
HBP	high blood pressure	*syr.* (syrupus)	*syrup*
HRT	hormone replacement therapy	*tab.* (tabletta)	*tablet*

HT or HTN	hypertension
IOP	intraocular pressure
MI	myocardial ischemia/ infarction
OA	osteoarthritis
Pt	patient
SOB	shortness of breath
TPN	total parenteral nutrition
URI	upper respiratory infection
UTI	urinary tract infection

Dosage Forms/Vehicles

amp.	ampul
cap.	*capsule*
D5LR	dextrose 5% in lactated Ringer's

Routes of Administration

CIVI	continuous (24 hour) intravenous infusion
ID	intradermal
IM	intramuscular
IT	intrathecal
IV	intravenous
IVB	intravenous bolus
IV Drip	intravenous infusion
IVP	intravenous push
IVPB	intravenous piggy back
NGT	nasogastric tube
p.o. or PO (*per os*)	by mouth
rect.	rectal or rectum
SL	sublingual
SubQ	subcutaneously
Top.	topically
V or PV	vaginally

Recommendations to decrease errors

- *A whole number should be shown without a decimal point and without a terminal zero (e.g., express 4 milligrams as 4 mg and not as 4.0 mg).*
- *A quantity smaller than one should be shown with a zero preceding the decimal point (e.g., express two tenths of a milligram as 0.2 mg and not as .2 mg).*
- *Leave a space between a number and the unit (e.g., 10 mg and not 10mg).*
- *Use whole numbers when possible and not equivalent decimal fractions (e.g., use 100 mg and not 0.1 g).*
- *Use the full names of drugs and not abbreviations (e.g., use phenobarbital and not PB).*
- *Use USP designations for units of measure (e.g., for grams, use g and not Gm or gms; for milligrams, use mg and not mgs or mgm).*
- *Spell out "units" (e.g., use 100 units and not 100 u or 100 U since an illegible U may be misread as a zero, resulting in a 10-fold error, i.e., 1000). The abbreviation I.U., which stands for "International Units," should also be spelled out so it is not interpreted as I.V., meaning "intravenous."*
- *Certain abbreviations that could be mistaken for other abbreviations should be written out (e.g., write "right eye" or "left eye" rather than use o.d. or o.l., and spell out "right ear" and "left ear" rather than use a.d. or a.l.).*

- *Spell out "every day" rather than use q.d.; "every other day," rather than q.o.d; and "four times a day," rather than q.i.d to avoid misinterpretation.*
- *Avoid using d for "day" or "dose" because of the profound difference between terms, as in mg/kg/day versus mg/kg/dose.*
- *Integrate capital or "tall man" letters to distinguish between "look alike" drug names, such as AggreSTAT and AggreNOX; hydrOXYZINE and hydrALAZINE; and DIGoxin and DESoxyn.*
- *Amplify the prescriber's directions on the prescription label when needed for clarity (e.g., use "Swallow one (1) capsule with water in the morning" rather than "one cap in a.m.").*

Examples of prescription directions to the pharmacist:

(a) *M. ft. ung.*
Mix and make an ointment.

(b) *Ft. sup. no xii*
Make 12 suppositories.

(c) *M. ft. cap. d.t.d. no. xxiv*
Mix and make capsules. Give 24 such doses.

Examples of prescription directions to the patient:

(a) *Caps. i. q.i.d. p.c. et h.s.*
Take one (1) capsule four (4) times a day after each meal and at bedtime.

(b) *gtt. ii rt.eye every a.m.*
Instill two (2) drops in the right eye every morning.

(c) *tab. ii stat tab. 1 q. 6 h. × 7 d.*
Take two (2) tablets immediately, then take one (1) tablet every 6 hours for 7 days.

CASE IN POINT 4.1: A pharmacist received the following prescription, which requires the correct interpretation of abbreviations prior to engaging in calculations, compounding, labeling, and dispensing.

℞

Lisinopril	
Hydrochlorothiazide aa.	10 mg
Calcium Phosphate	40 mg
Lactose q.s. ad	300 mg
M.ft. cap. i D.T.D. # 30	
Sig: cap. i AM a.c.	

(a) How many milligrams each of lisinopril and hydrochlorothiazide are required to fill the prescription?
(b) What is the weight of lactose required?
(c) Translate the label directions to the patient.

Case in Point 4.1

(a) Since aa. means "of each," 10 mg lisinopril and 10 mg hydrochlorothiazide are needed for each capsule. And since D.T.D. means "give of such doses," 30 capsules are to be prepared. Thus,

10 mg lisinopril × 30 (capsules) = 300 mg lisinopril and

10 mg hydrochlorothiazide × 30 (capsules) = 300 mg hydrochlorothiazide are needed to fill the prescription.

(b) Since q.s. ad means "a sufficient quantity to make," the total in each capsule is 300 mg. The amount of lactose per capsule would equal 300 mg less the quantity of the other ingredients (10 mg + 10 mg + 40 mg), or 240 mg. Thus,

240 mg lactose/capsule × 30 (capsules) = 7200 mg = 7.2 g lactose.

(c) Take one (1) capsule in the morning before breakfast.

Examples:

℞ Hydrochlorothiazide 50 mg
No. XC
Sig. i q AM for HBP

If the prescription was filled initially on April 15, on about what date should the patient return to have the prescription refilled?

Answer: 90 tablets, taken 1 per day, should last 90 days, or approximately 3 months, and the patient should return to the pharmacy on or shortly before July 15 of the same year.

℞ Penicillin V Potassium Oral Solution 125 mg/5 mL

Disp._____mL

Sig. 5 mL q 6h ATC × 10 d

How many milliliters of medicine should be dispensed?

Answer: 5 mL times 4 (doses per day) equals 20 mL times 10 (days) equals 200 mL.

A pharmacist may calculate a patient's percent compliance rate as follows:

$$\%\ \text{Compliance rate} = \frac{\text{Number of days supply of medication}}{\text{Number of days since last Rx refill}} \times 100$$

Example:

What is the percent compliance rate if a patient received a 30-day supply of medicine and returned in 45 days for a refill?

$$\%\ \text{Compliance rate} = \frac{30\ \text{days}}{45\ \text{days}} \times 100 = 66.6\%,\ \textit{answer}.$$

In determining the patient's actual (rather than apparent) compliance rate, it is important to determine if the patient had available and used extra days' dosage from some previous filling of the prescription.

Presentation by students

- **Medication Scheduling,**
- **Medication Adherence,**
- **Errors and Omissions**

Homework

1. Interpret each of the following *Subscriptions* (directions to the pharmacist) taken from prescriptions:
   (a) Disp. supp. rect. no. xii
   (b) M. ft. iso. sol. Disp. 120 mL.
   (c) M. et div. in pulv. no. xl
   (d) DTD vi. Non rep.
   (e) M. et ft. ung. Disp. 10 g
   (f) M. et ft. caps. DTD xlviii
   (g) M. et ft. susp. 1 g/tbsp. Disp. 60 mL.
   (h) Ft. cap. #1. DTD no.xxxvi N.R.
   (i) M. et ft. pulv. DTD #C
   (j) M. et ft. I.V. inj.
   (k) Label: hydrocortisone, 20 mg tabs.

2. Interpret each of the following *Signas* (directions to the patient) taken from prescriptions:
   (a) Gtt. ii each eye q. 4 h. p.r.n. pain.
   (b) Tbsp. i in ⅓ gl. aq. q. 6 h.
   (c) Appl. a.m. & p.m. for pain prn.
   (d) Gtt. iv right ear m. & n.
   (e) Tsp. i ex aq. q. 4 or 5 h. p.r.n. pain.
   (f) Appl. ung. left eye ad lib.

(g) Caps i c̄ aq. h.s. N.R.
(h) Gtt. v each ear 3× d. s.o.s.
(i) Tab. i sublingually, rep. p.r.n.
(j) Instill gtt. ii each eye of neonate.
(k) Dil. c̄ = vol. aq. and use as gargle q. 5 h.
(l) Cap. ii 1 h. prior to departure, then cap. i after 12 h.
(m) Tab i p.r.n. SOB
(n) Tab i qAM HBP
(o) Tab ii q 6h ATC UTI
(p) ʒii 4×d p.c. & h.s.
(q) ℥ss a.c. t.i.d.
(r) Add crushed tablet to pet's food s.i.d.