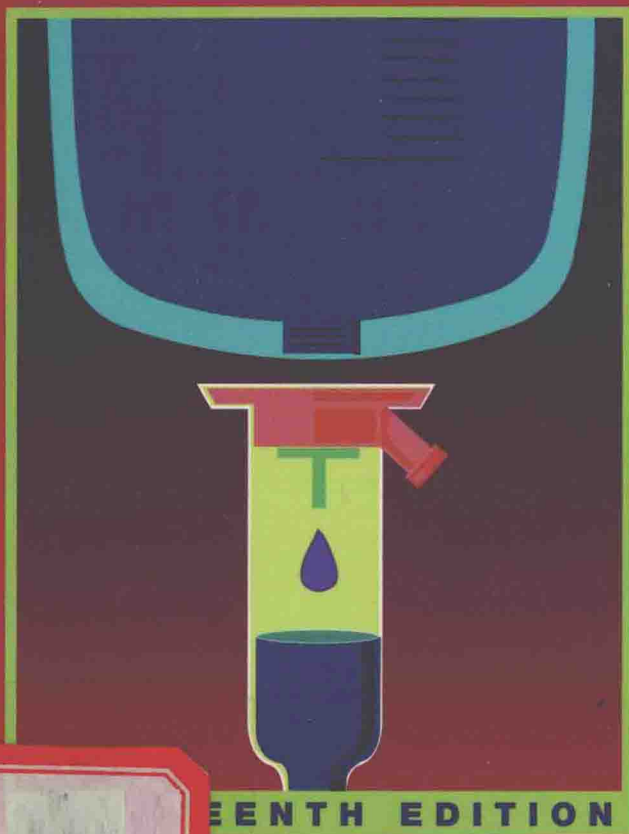


25TH

anniversary
edition

1998

INTRAVENOUS MEDICATIONS



FIFTEENTH EDITION

PHYLLIS L. GAHART
AND MARIE R. NAZARENO

 Mosby

INTRAVENOUS MEDICATIONS

**A Handbook for Nurses
and Allied Health Professionals**

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FOURTEENTH EDITION

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FOURTEENTH EDITION

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A NOTE TO THE READER: The authors and publisher have made every attempt to check dosages and nursing content for accuracy. Because the science of pharmacology is continually advancing, our knowledge base continues to expand. We therefore recommend that the reader always check product information for changes in dosage or administration before administering any medication. This is particularly important with new or rarely used drugs.

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How to Use This Book

STEP 1

Refer to the index at the back of the book. You can find any drug by any name in less than 5 seconds. All drugs are cross-indexed by generic and all known trade names. The index is easily distinguished by a printed black bar at the edge of the pages. Drugs are also indexed by pharmacological action. With one turn of the page, all drugs included in the text with similar pharmacological actions and their page numbers are available to you. Everything is strictly alphabetized; you will never be required to refer to additional pages to locate a drug.

STEP 2

Turn to the single page number given after the name of the drug. All information about the drug is included as continuous reading. You will rarely be required to turn to another section of the book to be completely informed. Specific breakdown of each drug (usual dose, pediatric dose, dose adjustments, dilution, rate of administration, actions, indications and uses, precautions, contraindications, drug/lab interactions, side effects, and antidote) are consistent in format and printed in boldface type. Subheadings under these categories are in boldface italics. Scan quickly for a usual dose check, dose adjustment, drug/lab interaction, side effect, or antidote or carefully read all included information. The choice is yours. A quick scan will take 5 to 10 seconds. Even the most complicated drugs will take less than 2 minutes to read completely. Read each monograph carefully and completely before administering a drug to a specific patient for the first time and review it anytime a new drug is added to the patient's drug profile.

That's it! A fast, complete, and accurate reference for anyone administering intravenous medications. The spiral binding is specifically designed to lie flat, leaving your hands free to secure needed supplies, prepare your medication, or even ventilate a patient while you read the needed information.

Develop the "look it up" habit. Clear, concise language and simplicity of form contribute to quick, easy use of this handbook. Before your first use, read the preface; it contains lots of helpful information.

Intravenous medication	D2½	D5	D10	D5			NS	½NS	R	LR	D5R	D5LR
				0.2 S	0.45 S	NS						
Metoclopramide Hcl		C			C		C		C	C		
Mezlocillin Na		C	C	C	C		C		C	C		
Morphine sulfate	C	C	C	C	C	C	C	C	C	C	C	C
Multi-vitamin infusion		C	C			C	C			C		C
Nafcillin Na		C	C	C	C	C	C		C	C	C	C
Netilmicin sulfate		C	C	C		C	C		C	C		C
Normal serum albumin (human)	C	C	C	C	C	C	C	C	C	C	C	C
Ofloxacin		C			C	C	C					C
Ondansetron Hcl		C		C	C	C	C		C	C		
Oxacillin Na		C	C			C	C			C		C
Oxytocin injection	C	C	C	C	C	C	C	C	C	C	C	C
Penicillin G. Aqueous	C	C	C	C	C	C	C	C	C	C	C	C
Pentobarbital Na	C	C	C	C	C	C	C	C	C	C	C	C
Phenylephrine Hcl	C	C	C	C	C	C	C	C	C	C	C	C
Phosphate	C	C	C	C	C	C	C	C				
Piperacillin Na		C				C	C			C		
Potassium acetate		C	C				C			C		C
Potassium Cl -	C	C	C	C	C	C	C	C	C	C	C	C
Prochlorperazine edisylate	C	C	C	C	C	C	C	C	C	C	C	C
Propranolol Hcl		C			C	C	C	C		C		
Pyridoxine Hcl		C	C			C	C	C	C			C
Ranitidine		C	C		C		C			C		
Sodium acetate		C	C			C	C	C	C			C
Sodium bicarbonate	C	C	C	C	C	C	C	C				
Succinylcholine Cl	C	C		C	C	C	C		C	C	C	C
Thiamine Hcl	C	C	C	C	C	C	C	C	C	C	C	C
Thiotepa		C				C	C		C	C		
Tolazoline Hcl	C	C	C	C	C	C	C	C	C	C	C	C
Trace metals		C	C			C	C			C		
Verapamil Hcl		C			C	C	C	C	C	C	C	C
Vidarabine	C	C	C	C	C	C	C	C	C	C	C	C
Zidovudine		C				C	C			C		C

This chart is not all inclusive and is based on manufacturer's recommendations and Trissel's

Key

C = Compatible
 D2½ = 2½% dextrose in water
 D5 = 5% dextrose in water
 D10 = 10% dextrose in water
 D5/0.2S = 5% dextrose in saline 0.2%
 D5/0.45S = 5% dextrose in saline 0.45%
 D5/NS = 5% dextrose in normal saline
 NS = normal saline (0.9%)
 ½NS = ½ normal saline (0.45%)
 R = Ringer's solution

LR = Lactated Ringer's solution
 D5R = 5% dextrose in Ringer's solution
 D5LR = 5% dextrose in Lactated Ringer's solution
 4 = stable for 4 hours
 8 = stable for 8 hours
 10 = stable for 10 hours
 P = preferred
 L = use in limited amounts
 C = specific concentration only

INTRAVENOUS MEDICATIONS

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Preface

This 1998 edition marks the twenty-fifth year of publication of *Intravenous Medications*.

This has been another huge year for new IV drug approvals by the FDA. Fifteen new drugs are included in this fourteenth edition. Several of these new drugs represent phenomenal changes and improvements in drug development and methods of delivery (e.g., liposomal and recombinant preparations). In addition, there are many important updates, such as changes in dose, new pediatric doses, additional disease-specific doses, refinements in dosing applications, new indications, new drug interactions, additional precautions, and new information in antidotes. Helpful charts for dilution and/or rate of administration are incorporated in selected monographs. A diluent compatibility chart is on the back cover. Appendix E provides a generic dilution chart to simplify calculations. An IV form of azithromycin and an update on midazolam were released after the composition of this edition was complete. This newly released information can be found in Appendix F. Front material provides a key to abbreviations and Important IV Therapy Facts.

Health care today is an intense environment. The speed of change is overwhelming, but the authors and publisher of *Intravenous Medications* have a commitment to provide all health professionals who have the responsibility to administer IV medications with annual editions incorporating complete, accurate, current information in a clear, concise, accessible, and reliable tool. Each specific drug must be able to be interpreted for a specific patient. All drugs currently approved for intravenous use (with the exception of opaque dyes used in radiology, some general anesthetics used only in OR, and a few rarely used drugs [see Appendix B]) are included. In addition, all information has been thoroughly revised to incorporate the most current documented knowledge available.

Intravenous Medications is designed for use in critical care areas, at the nursing station, in the office, in public health and home care settings, and by students and the armed services. Pertinent information can be found in a few seconds. Take advantage of its availability and quickly review every intravenous medication before administration.

The nurse is frequently placed in a variety of difficult situations. While the physician verbally requests or writes an order, the nurse must evaluate it for appropriateness, prepare it, administer it, and observe the effects. Intravenous drugs are instantly absorbed into the bloodstream, hopefully leading to a prompt therapeutic action, but the risk of an inappropriate reaction is a constant threat that can easily become a frightening reality. It will be the nurse who must initiate emergency measures should adverse effects occur. This is an awesome responsibility.

If, after reviewing the information in *Intravenous Medications*, you have any questions about any order you are given, clarify it with the physician, consult with the pharmacist, or consult your supervisor. The circumstances will determine whom you approach first. If the physician thinks it is imperative to carry out an order even though you have unanswered questions or

concerns, never hesitate to request that the physician administer the drug, drug combination, or dose himself or herself. In this era of constant change, the physician should be very willing to supply you, your supervisor, and/or the pharmacist with current studies documenting the validity and appropriateness of orders.

All information presented in this handbook is pertinent only to the intravenous use of the drug and not necessarily to intramuscular, subcutaneous, oral, or other means of administration.

Our sincere appreciation is extended to Gregory Nazareno, Charlotte Deneen, Linda Grant, and Merrilee Newton for their assistance. Thanks to each of you, the users of this reference, for your quest for information and your loyalty to the references that serve your needs and thus your patients' needs. We will continue to strive to earn your trust and confidence as we look forward together to an exciting future for health care.

Lois L. Gehart

Adrienne R. Rogers

To my husband,

Bill,

for his patience, support, and many hours of much needed and appreciated assistance and to our children, their spouses, and our grandchildren for their encouragement and understanding.

BLG

To my husband,

Greg,

for his loving support and encouragement and to my children, Danielle, Bryan, Emily, and Mark, for allowing me the freedom to pursue my professional practice.

ARN

PUBLISHER'S HISTORICAL NOTE

This fourteenth edition marks the twenty-fifth year anniversary of *Intravenous Medications*.

First published in 1973, *Intravenous Medications* was the first and only book of its kind for many years. The book has been published annually since 1989 to meet the growing demand for currency due to the large number of drugs approved each year for IV use. Nearly 500,000 nurses and other health professionals who administer IV medications have purchased the book since 1973. Today this successful handbook is considered by many professionals to be an indispensable reference.

Mosby-Year Book is delighted to continue its association with Betty Gahart and Adrienne Nazareno and to be a part of their distinguished contributions to the health profession.

Format and Content of *Intravenous Medications*

Designed to facilitate quick reference, each entry begins with the generic name of the drug in boldface type. Drug categories follow. The primary category may be followed by additional ones representing the multiple uses of a drug. Associated trade names are under the generic name. Boldface type and alphabetical order enable the reader to verify correct drug names easily. The use of a Canadian maple leaf symbol (♣) preceding a trade name indicates availability in Canada only. The pH is listed in the lower right-hand corner of the title section. While this information is not consistently available, it is provided whenever possible. It represents the pH of the undiluted drug, the drug after reconstitution, or the drug after dilution for administration.

Headings within drug monographs are as follows:

Usual dose: Doses recommended are the usual range for adults unless specifically stated otherwise. This information is presented first to enable the nurse to verify that the physician order is within acceptable parameters while checking the order and before preparation. If there are any questions, much time can be saved in clarifying them.

Pediatric dose: Pediatric doses are specifically stated if they vary from mg/kg of body weight or M² dose recommended for adults. Not all drugs are recommended for use in children.

Infant and/or neonatal dose: Included if available and distinct from Pediatric dose.

Dose adjustments: Any situation that requires increasing or decreasing a dose will be mentioned here. The range will cover adjustments needed for the elderly, debilitated, or patients with hepatic or renal impairment, to adjustments required in the presence of other medications or as physical conditions are monitored.

Dilution: Specific directions for dilution are given for all drugs if dilution is necessary or permissible. Appropriate diluents are listed. Additional solution compatibilities may be found in the chart on the back cover. This is the only reference that provides calculation examples to simplify dilution and accurate dose measurement. Charts are available in selected monographs. If recommendations for pediatric dilutions are available, they are listed. In some situations mcg or mg/ml dilutions partially account for this variation. If there are any doubts, consult with the pharmacist and/or pediatric specialist. Generic dilution charts for grams to milligrams and milligrams to micrograms are in Appendix E.

Storage: A subheading. Content here includes such items as stability, refrigeration versus room temperature, predilution versus postdilution.

Incompatible with: Incompatible drugs are alphabetized by generic name for ease in locating the drugs with which you are working. To make identification easier, common trade names accompany generic names, or examples are presented for drug categories. Again, no other reference consistently provides this helpful information. Not all incompatibilities are absolute. They are intended to alert the nurse to a problem requiring consultation with a pharmacist or the physician. It may be that a specific order of mixing is required or that partic-

ular drugs are compatible only in a specific solution. Knowledge is growing daily in this field. After receiving specific directions from the pharmacist on correctly mixing two drugs that have a compatibility problem, write the directions on the patient's medication record or nursing care plan so others will not have to retrace your research steps when the medication is to be given again. For some drugs additive and/or Y-site compatibilities are listed.

Requests have been received to include compatibilities for all drugs. While there is no question that this is valuable information, the specifics involved make it difficult to include. All compatibility data are based on specific concentrations of both drugs, and these concentrations may or may not be related to usual dose and dilution. Detailing all concentrations is beyond the scope of this handbook. The pharmacist has access to extensive references dedicated to compatibilities and is the best reference source when questions arise.

Rate of administration: Accepted rates of administration are clearly stated. As a general rule, a slow rate is preferred. 25-gauge needles aid in giving a small amount of medication over time. Problems with rapid or slow injection rates are indicated here. Adjusted rates for infants, children, or the elderly are listed when available. Charts are available in selected monographs.

Actions: Clear, concise statements outline the origin of each drug, how it affects body systems, its length of action, and methods of excretion. If a drug crosses the placental barrier or is secreted in breast milk, it will be mentioned here.

Indications and uses: Uses recommended by the manufacturer are listed. Investigational or unlabeled uses are stated as such.

Contraindications: Contraindications are those specifically listed by the manufacturer. Consult with the physician if an ordered drug is contraindicated for the patient. The physician may have additional historical information that alters the situation or may decide that use of the drug is indicated in a critical situation.

Precautions: The section on precautions covers many areas of information needed before injecting any drug. The range covers all facets not covered under specific headings. There is no prioritizing; each listing is as important as the next. To make it easier for spot checks (after reading the entire monograph), additional subdivisions are now included.

Monitor: A subheading that includes information such as required prerequisites for drug administration, parameters for evaluation, and patient assessments.

Patient education: A subheading that addresses only specific, important issues. It is expected that the health professional will always review the major points in the drug profile with any conscious patient; side effects to expect, how to cope with them, when to report them, special requirements such as the intake of extra fluids, and an overall review of what the drug does, why it is needed, and how long the patient can anticipate receiving it.

Maternal/child: A subheading that addresses FDA pregnancy categories (see Appendix C for a complete explanation), any known specifics affecting patients capable of conception, safety for use during lactation, safety for use in children, and any special impact on infants and neonates.

Elderly: A subheading that is included whenever specific information impacting this patient group is available. Always consider age-related

organ impairment (e.g., cardiac, hepatic, renal, insufficient bone marrow reserve) and route of excretion when determining dose and evaluating side effects.

Drug/lab interactions: Drug/drug or drug/lab interactions are listed here. If a conflict with the patient's drug profile is noted, consult a pharmacist immediately. Increasing or decreasing the effectiveness of a drug can be a potentially life-threatening situation. Check with the lab first on drug/lab interactions; acceptable alternatives are usually available. After this consultation, notify the physician if appropriate. To facilitate recognition, common trade names accompany generic names or examples are presented for drug categories. No other reference consistently provides this helpful information.

Side effects: Alphabetical order simplifies confirmation that a patient's symptom could be associated with specific drug use. Where there is a distinct line of tolerance for side effects, they are listed as minor or major and alphabetized after each of these subheadings. If a manufacturer provides percent of frequency, that information is listed.

Antidote: Specific antidotes are listed in this section. In addition, specific nursing actions to reverse undesirable side effects are clearly stated—an instant refresher course for critical situations.

Key to Abbreviations

<	less than
>	more than
1/2 NS	one-half normal saline (0.45%)
ACE	angiotensin converting enzyme
ACT	activated coagulation time
AIDS	acquired immune deficiency syndrome
ALT	(SGPT) alanine aminotransferase
aPTT	activated partial thromboplastin time
AST	(SGOT) aspartate aminotransferase
BP	blood pressure
BUN	blood urea nitrogen
C	celcius; centigrade
Ca	calcium
CBC	complete blood count
CHF	congestive heart failure
Cl	chloride
CNS	central nervous system
Co ₂	carbon dioxide
CPK	creatine-kinase
CrCl	creatinine clearance
CRT	controlled room temperature
CSF	cerebrospinal fluid
C/S	culture and sensitivity
CVP	central venous pressure
D10/NS	10% dextrose in normal saline
D10W	10% dextrose in water
D5/0.2NS	5% dextrose in one-quarter NS (0.2%)
D5/0.45NS	5% dextrose in one-half normal saline (1/2NS)
D5/LR	5% dextrose in lactated Ringer's solution
D5/NS	5% dextrose in normal saline
D5/R	5% dextrose in Ringer's solution
D5W	5% dextrose in water
dL	deciliter(s) (100 ml)
DNA	deoxyribonucleic acid
ECG	electrocardiogram
EEG	electroencephalogram
F	fahrenheit
GI	gastrointestinal
gm	gram(s)
gr	grain(s)
gtt	drop(s)
GU	genitourinary
Hb	hemoglobin
Hct	hematocrit
Hg	mercury
HIV	human immunodeficiency virus
hr	hour
HR	heart rate

IgA	immune globulin A
IM	intramuscular
IU	international unit(s)
IV	intravenously
K	potassium
KCL	potassium chloride
kg	kilogram(s)
L	liter(s)
lb	pound(s)
LDH	lactic dehydrogenase
LR	lactated Ringer's injection or solution
M	molar
M ²	meter squared
MAO	monoamine oxydase
mcg	microgram(s)
mCi	millicurie(s)
mEq	milliequivalent
Mg	magnesium
mg	milligram(s)
MI	myocardial infarction
min	minute
ml	milliliter
mmol	millimole(s)
Na	sodium
NaCl	sodium chloride
ng	nanogram (millimicrogram)
NS	normal saline (0.9%)
NSAID	nonsteroidal antiinflammatory drug
NSR	normal sinus rhythm
Pao ₂	arterial oxygen pressure
PCA	patient controlled analgesia
pH	hydrogen ion concentration
PSVT	paroxysmal supraventricular tachycardia
PT	prothrombin time
PTT	partial thromboplastin time
R	Ringer's injection or solution
RBC	red blood cell or count
RNA	ribonucleic acid
SC	subcutaneous
S/S	signs and symptoms
SW	sterile water for injection
TT	thrombin time
VF	ventricular fibrillation
VT	ventricular tachycardia
WBC	white blood cell or count
WBCT	whole blood clotting time

Important IV Therapy Facts

- Read the Preface and Format and Contents sections at least once. They'll answer many of your questions and save time.

USUAL DOSE

- Doses calculated on body weight are usually based on pretreatment weight and not on edematous weight.
- Normal renal or hepatic function is usually required for drugs metabolized by these routes.

DILUTION

- Check all labels (drugs, diluents, and solutions) to confirm appropriateness for IV use.
- Sterile technique is imperative in all phases of preparation.
- Use a filter needle when withdrawing IV meds from ampoules to eliminate possible pieces of glass.
- Pearls: 1 Gm in 1 Liter yields 1 mg/ml
1 mg in 1 Liter yields 1 mcg/ml
% of a solution equals the number of grams/100 ml
(5% = 5 Gm/100 ml)
- Pediatric dilution: If you dilute 6.0 mg/kg in 100 ml, 1 ml/hr equals 1.0 mcg/kg/min
If you dilute 0.6 mg/kg in 100 ml, 1 ml/hr equals 0.1 mcg/kg/min
- Do not use bacteriostatic diluents containing benzyl alcohol for neonates.
- Ensure adequate mixing of all drugs added to a solution.
- Examine solutions for clarity and any possible leakage.
- Syringe prepackaging for use in specific pumps is now available for many drugs. Concentrations are often the strongest permissible, but length of delivery is accurate.

INCOMPATIBILITIES

- Some manufacturers routinely suggest discontinuing the primary IV for intermittent infusion; usually done to avoid any possibility of incompatibility. Flushing the line before and after administration may be indicated and/or appropriate for some drugs.
- The brand of intravenous fluids or additives, concentrations, containers, rate and order of mixing, pH, and temperature all affect solubility and compatibility. Consult your pharmacist with any question, and document appropriate instructions on care plan.

TECHNIQUES

- Never hang plastic containers in a series connection; may cause air embolism.
- Confirm patency of peripheral and/or central sites. Avoid extravasation.
- Avoid accidental arterial injection; can cause gangrene.

RATE OF ADMINISTRATION

- Life-threatening reactions (time-related overdose or allergy) are frequently precipitated by a too-rapid rate of injection.