THE TEDDY BEAR BOOK

# Pediatric Injectable DRUGS

TENTH EDITION

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# Dedication

This edition is dedicated to our families who sacrificed a tremendous amount of "quality time" to make it possible for us to participate in this project. We are forever indebted to them, and to our friends and loved ones for their patience, encouragement, motivation, and endless support.

# Publisher's Note

This QR code will enable you to check for any updates or corrections that have been issued on this edition as well as information about the forthcoming mobile app. You can also visit www.ashp.org/teddybear to access updates, corrections, and information about the forthcoming mobile app.

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# About the Editors

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**Kelley R. Lee, PharmD, BCPS,** received her doctorate of pharmacy degree from The University of Tennessee Health Science Center. She completed a two-year residency in pediatric pharmacotherapy at Le Bonheur Children's Hospital and The University of Tennessee Health Science Center. After residency training, Dr. Lee served as a Clinical Pharmacy Specialist and then the Clinical Pharmacy Manager at Le Bonheur Children's Hospital and part-time Professor of Clinical Pharmacy at The University of Tennessee Health Science Center. She has recently shifted focus to infectious diseases and is currently a Clinical Pharmacy Specialist in Antimicrobial Stewardship at Le Bonheur Children's Hospital. Her practice and research interests have primarily been the appropriate use of medications in pediatric patients, particularly with the use of antibiotics. In addition to serving as a contributing writer for several editions of this book, she has published numerous manuscripts, abstracts, and letters-to-the-editor on this subject.

**A. Jill Thompson, PharmD, BCPS,** earned her doctor of pharmacy degree from The University of Tennessee Health Science Center in 2001 and completed PGY1 and PGY2 residencies in Pediatric Pharmacy Practice at Le Bonheur Children's Medical Center in Memphis, Tennessee, from 2001 to 2003. Dr. Thompson is the Coordinator of Pediatric Clinical Pharmacy Services and is a Clinical Specialist in Pediatric Critical Care in the Department of Pharmacy Services, Medical University of South Carolina (MUSC), Charleston, South Carolina. She also serves as an Adjunct Assistant Professor in the Department of Clinical Pharmacy and Outcomes Sciences at the South Carolina College of Pharmacy, MUSC Campus. Dr. Thompson participates in clinical research regarding pediatric critical care and works closely with the pharmacy residency programs at MUSC. She is recognized as a Board-Certified Pharmacotherapy Specialist and is a member of the American College of Clinical Pharmacy, Pediatric Pharmacy Advocacy Group, and the Society of Critical Care Medicine. She has served as manuscript editor for the *Journal of Pediatric Pharmacology and Therapeutics* for seven years and is now a member of the editorial board.

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# Preface

In the late 1930s, elixir sulfanilamide was marketed for the treatment of streptococcal infections. The poor solubility of the antibiotic made it difficult to create a liquid formulation; hence, the medication was mixed with diethylene glycol. Although the company tested the raspberry-flavored product for palatability, it was not tested for safety before distribution. *Unfortunately*, more than 100 individuals, including many children, died following its ingestion. In 1949, intravenous chloramphenicol, a bacteriostatic antimicrobial, became an important agent in the treatment of a variety of pediatric infectious diseases. *Unfortunately*, the medication caused significant vomiting, ashen-gray color of the skin, limp body tone, distended abdomen, hypotension, and cardiovascular collapse. This phenomenon, termed *gray-baby syndrome*, resulted in the death of hundreds of newborns who lacked the hepatic enzymes (i.e., UDP-glucuronyl transferase) necessary to metabolize large doses of the medication and the required renal maturity to excrete the unconjugated drug. Thalidomide was introduced in the late 1950s as a sleeping pill but was quickly noted to prevent nausea and vomiting during early pregnancy. *Unfortunately*, it was subsequently found to cause significant birth defects and was removed from the market. In 1983, the intravenous vitamin E supplement, E-Ferol, was marketed. *Unfortunately*, within 3 months, its use was associated with ascites, liver and renal failure, thrombocytopenia, and death in low birth weight infants. This tragedy was ultimately attributed to the polysorbates added as emulsifiers; a new drug application had not been submitted to the Food and Drug Administration (FDA) prior to use. *Unfortunately*, there are other noteworthy therapeutic disasters including valproate hepatotoxicity in young children, aspirin and Reye syndrome, benzyl alcohol and fatal gasping syndrome, and the list goes on. The negative effects of these therapeutic disasters have led to more structured drug regulations and control over drug use and development including passage of the 1938 Federal Food, Drug, and Cosmetic Act.

Regardless of profession, those practicing in pediatrics understand that the vast majority of medications given are used off label. In fact, as much as 75% of all medications used in this population are not approved by the FDA for use in either the specific age group or disease for which it is administered. Despite the National Institutes of Health's creation of the Pediatric Pharmacology Research Units (PPRUs) and the FDA Modernization Act (FDAMA), much of the necessary research to validate safety and efficacy of medications has yet to be conducted in all pediatric populations. The impact of FDAMA has been important as more than 100 industry-sponsored studies have been conducted, but much of the effort has not included premature and full-term neonates and infants.

The reasons for lack of information and subsequent FDA approval is multifactorial and relates to priorities in pharmaceutical industry and federal funding, the belief that we need to protect our most vulnerable from medication-associated harm, and ethical considerations such as voluntary participation and informed consent/assent, which in many cases is not possible to obtain due to the patient's young age. All stakeholders must continue to proactively discuss the issues that surround drug research and prevention of therapeutic misadventures in the pediatric population.

The tenth edition of *Pediatric Injectable Drugs (The Teddy Bear Book)* has three new editors. Collectively, these editors bring 75 years of pediatric pharmacy practice experience to the book and represent the practice approaches and philosophies of three different institutions. Beyond general pediatric pharmacotherapy, the specific expertise of the editors includes critical care medicine, hematology and oncology, infectious diseases, and neurology.

This edition of *Pediatric Injectable Drugs (The Teddy Bear Book)* has been revised to include 238 parenteral medications. Twenty new monographs, some of which are newly marketed drugs, have been added. Previously published monographs have been extensively reviewed and updated to include the most recent literature available. Information included in this text was compiled in an evidence-based manner from, in most cases, the primary literature

including case reports, observational reports, and comparative trials. Limited information is available for some of the frequently used older drugs in which case recommendations may come from textbooks. Importantly, the references are provided in the back of the book according to generic drug names, thereby allowing readers to access the source of the information provided and make independent decisions related to their specific patients.

With this edition, *Pediatric Injectable Drugs (The Teddy Bear Book)* will also be available as both a mobile app and as an eBook. For information on the mobile app, go to www.ashp.org/teddybear. The eBook version of *Pediatric Injectable Drugs (The Teddy Bear Book)* can be purchased through ASHP eBooks (ebooks.ashp.org) or from Amazon Kindle, the Apple iBookstore, or Barnes & Noble Nook.

We hope that this text improves your ability to safely and effectively use medications in all members of the pediatric community and that ultimately the information contained in this reference will not only facilitate their recovery, enhance their quality of life, and prevent *unfortunate* therapeutic misadventures, but also enable you to sleep better at night.

*Stephanie J. Phelps*
*Tracy M. Hagemann*
*Kelley R. Lee*
*A. Jill Thompson*
2013

# Introduction

The following guidelines were developed to provide a single authoritative source of information on the parenteral administration of medications to pediatric patients. All recommendations should be individualized in accordance with the clinical situation.

This tenth edition of ASHP's *Pediatric Injectable Drugs* has been updated to improve existing sections and to make them more user-friendly through their placement in the monograph and with the addition of more specific subheadings. The tenth edition provides the following information for updates to 238 drugs and all references that support information contained in the text.

**Brand names**

Common brand names and, if applicable, other names (synonyms) are listed.

**Medication error potential**

If the drug was included in the ISMP's *List of High-Alert Medications*, ISMP's *List of Confused Drug Names*, or the USP's *Findings of Look-alike and/or Sound-alike Drug Errors* at the time the monograph was written, it will be noted in this section. Tall man letters, per FDA and ISMP recommendations, will be used in this section, as well as in the monograph title and in the title in the references, if applicable.

**Contraindications and warnings**

While it may be noted in the monographs, it is understood that a drug would be contraindicated in a patient who has experienced a prior anaphylaxis or type I hypersensitivity reaction. U.S. Boxed Warnings, Contraindications, and Other Warnings, if applicable, will be described under subheadings in this section. The Other Warnings subheading will describe warnings deemed noteworthy and may not be the complete list of warnings included in the manufacturer's labeling. It is recommended to review the labeling for the most complete list.

**Infusion-related cautions**

Warnings are provided where appropriate. If a drug requires premedication or if the administration of the drug necessitates the availability of another drug (i.e., to have on hand), information regarding premedication or the drug to have on hand will be provided in this section. If a drug should be given only via central access, this will be noted here. If a drug carries an increased risk of thrombophlebitis, infiltration, or extravasation, it will be noted in this section. Appendix E provides information regarding extravasation treatment for medications known to cause effects from infiltration or extravasation.

**Dosage**

Unless otherwise specified, dosages are for all age groups. These age groups are as follows: neonates (premature and term), up to 1 month; infants, 1–24 months; children, 2–12 years, and adolescents, 12–18 years. When applicable, *adult* dosing is also provided. While these age groups provide general guidelines for therapy in pediatric patients, it should be noted that changes in development, which affect drug pharmacokinetics and pharmacodynamics, and hence, dosing recommendations, are not confined to the limits of these defined age groups.

Dosage is often expressed as X mg/kg/day divided q Y–Z hours, where the total daily dose (X) is given in equally divided doses at evenly spaced intervals. Dosage may also be expressed as X mg/$m^2$/day divided q Y–Z hours, a calculation of body surface area (BSA) as determined from height and mass. See Appendix A for a BSA nomogram.

The presence of obesity may require the practitioner to estimate ideal body mass/weight and calculate an adjusted weight for the dosing of some medications. Appendix B provides a nomogram for estimating total body mass/weight.

**Dosage adjustment in organ dysfunction**

Drugs requiring dosage adjustment in patients with renal or hepatic dysfunction and serum drug concentration monitoring are indicated. The manufacturer's labeling and specialized references are provided when available. Information, if known, will also be included about dosage adjustment or therapeutic drug monitoring with dialysis, continuous renal replacement therapy, and with extracorporeal membrane oxygenation.

| | |
|---|---|
| **Maximum dosage** | Maximum dosages are referenced to primary literature where available. However, maximum dosages for pediatric patients are often extrapolated from *adult* data because of a lack of documented experience with pediatric patients. Many manufacturers caution against exceeding the maximum recommended *adult* dosage (usually expressed as X g/day) in pediatric patients. In this reference, when the maximum dosage is expressed as "mg/kg/day, not to exceed X g/day," "X g/day" is typically the manufacturer's maximum recommended *adult* dosage and should be used only as an upper limit for pediatric dosing. It should not be inferred that use of these maximum dosages in pediatric patients is recommended and is without risk of toxicity. Readers should consult the references indicated for information on the use of these maximum dosages in the pediatric population. |
| **Additives** | Pertinent additives, including sodium and those with a potential for toxicity or adverse effects, are listed. Please see Appendix C for specific information on common additives with a potential for toxicity or adverse effects. |
| **Suitable diluents** | If a drug can be mixed or diluted with a fluid, the appropriate fluids will be listed here. Compatible drugs will NOT be listed.<br><br>Drug stability in some of the IV solutions listed is limited. The manufacturer's labeling and specialized references (e.g., Trissel LA. *Handbook on Injectable Drugs*. 17th ed. Bethesda, MD: American Society of Health-System Pharmacists; 2013) should be consulted for detailed stability information. |
| **Maximum concentration** | Generally, any concentration up to the maximum may be administered, taking into consideration the patient's fluid status (and potential for loss of vascular access), administration method (IV push vs. intermittent infusion), drug administration rate (and drug administration device flow rate range, if applicable), dose (and degree of accuracy required in dose measurement), and drug stability. However, some drugs, as indicated in these guidelines, should not be diluted.<br><br>For drugs available as solutions that may be administered undiluted, the maximum concentration is the commercially available concentration. For drugs that must be reconstituted prior to administration, the maximum concentration should serve as a guide for the minimum dilution required.<br><br>Concentrations listed are referenced to literature on drug use in pediatric patients to the extent possible. However, concentrations administered to *adults* are cited where documentation on use in pediatric patients is insufficient. The references should be consulted. The IV Push, Intermittent Infusion, Continuous Infusion, and Other Routes of Administration sections all begin with information concerning the concentration or concentration range usual for that method or route of administration. |
| **Preparation and delivery** | When pertinent, issues related to preparation and delivery are included in this section and, if applicable, will be described under the following subheadings: Preparation, Delivery, Stability, Compatibility, and Photosensitivity. If a drug has information regarding compatibility with parenteral nutrition solutions, a statement will be included. Appendix D provides information regarding compatibility of medications with parenteral nutrition solutions. |
| **IV push** | This rate is generally expressed as a period of time over which the dose should be administered (seconds or minutes) or as a quantity of drug per unit of time. In the latter case, the size of the dose determines the administration time. For the purpose of this text, IV push is defined as <5 minutes. Drugs for which IV push administration is contraindicated are noted. |
| **Intermittent infusion** | The recommended infusion rate is expressed as a period of time over which the dose should be administered (minutes to hours) or as a quantity of drug per unit of time (size of dose determines administration time). |

**Continuous infusion**

The recommended infusion rate is usually expressed as a quantity of drug per unit of time; infusion is continued for 24 hours unless otherwise specified (e.g., until the desired therapeutic endpoint is achieved).

**Other routes of administration**

This section contains information on the appropriateness of other routes of administration, including IM, SC, ET, IT, and IO administration and the best site for administration. The terms *contraindicated* and *not recommended* will be used. *Contraindicated* implies that you do not administer the drug in that manner. *Not recommended* implies that it may have been administered in that manner, but it is not recommended to administer it in that manner. Drugs for which other routes of administration are contraindicated are noted.

**Comments**

Miscellaneous information is included when pertinent. Information pertaining to *adults* is sometimes included because, in the absence of reports on pediatric use, *adult* data may be relevant and may be cautiously extrapolated to the pediatric population.

When applicable, the following subheadings may be included in the comments section: Significant Adverse Effects, Rare Adverse Effects, Monitoring, Drug Interactions, Pharmacokinetic Considerations, Pharmacodynamic Considerations, Laboratory Interference, Osmolality, and Other.

# Abbreviations

**Solutions:**

| | |
|---|---|
| ABS | acrylonitrile, butadiene, and styrene |
| BW | bacteriostatic water for injection |
| D-LR | dextrose—Ringer's injection, lactated, combinations |
| D-R | dextrose—Ringer's injection combinations |
| D-S | dextrose—saline combinations |
| D10NS | dextrose 10% in sodium chloride 0.9% |
| D10W | dextrose 10% in water |
| D15W | dextrose 15% in water |
| D20W | dextrose 20% in water |
| D2.5W | dextrose 2.5% in water |
| D2.5½NS | dextrose 2.5% in sodium chloride 0.45% |
| D5LR | dextrose 5% in Ringer's injection, lactated |
| D5NS | dextrose 5% in sodium chloride 0.9% |
| D5¼NS | dextrose 5% in sodium chloride 0.225% |
| D5⅓NS | dextrose 5% in sodium chloride 0.3% |
| D5½NS | dextrose 5% in sodium chloride 0.45% |
| D5R | dextrose 5% in Ringer's injection |
| D5S | dextrose 5% in sodium chloride 0.9%, 0.45%, 0.3%, or 0.225% |
| D5W | dextrose 5% in water |
| LR | Ringer's injection, lactated |
| NS | sodium chloride 0.9% (normal saline) |
| ¼NS | sodium chloride 0.225% (¼ normal saline) |
| ⅓NS | sodium chloride 0.3% (⅓ normal saline) |
| ½NS | sodium chloride 0.45% (½ normal saline) |
| R | Ringer's injection |
| SW | sterile water for injection |

**Terms:**

| | |
|---|---|
| AAP | American Academy of Pediatrics |
| ABCD | amphotericin B colloidal dispersion |
| ABS | acrylonitrile, butadiene, and styrene |
| ABW | actual body weight |
| ACCP | American College of Chest Physicians |
| ACLS | advanced cardiovascular life support |
| ACT | activated clotting time |
| ACTH | adrenocorticotropic hormone |
| ADH | antidiuretic hormone |
| AED | antiepileptic drug |
| AHA | American Heart Association |
| AHF | antihemophilic factor |
| AIDS | acquired immunodeficiency syndrome |
| ALL | acute lymphocytic leukemia |

| | |
|---|---|
| ALT | alanine transaminase (may be referred to as SGPT) |
| AML | acute myeloid leukemia |
| ANA | antinuclear antibody |
| ANC | absolute neutrophil count |
| APAP | acetaminophen |
| aPTT | activated partial thromboplastin time |
| ARDS | acute respiratory distress syndrome |
| ASPEN | American Society for Parenteral and Enteral Nutrition |
| AST | aspartate aminotransaminase (may be referred to as SGOT) |
| ATG | antithymocyte globulin |
| AUC | area under the curve |
| AV | atrioventricular |
| AZT | azidothymidine |
| BAL | British anti-Lewisite |
| BG | blood glucose |
| BID | two times daily |
| BLC | blood lead concentration |
| BMI | body mass index |
| BMT | bone marrow transplant |
| BPD | bronchopulmonary dysplasia |
| BPM | beats per minute |
| BSA | body surface area |
| BUN | blood urea nitrogen |
| CABG | coronary artery bypass graft |
| CAPD | continuous ambulatory peritoneal dialysis |
| CBC | complete blood count |
| CDAD | *Clostridium difficile*–associated diarrhea |
| CDC | Centers for Disease Control and Prevention |
| CDH | congenital diaphragmatic hernia |
| CDP-1 | crystalline degradation product |
| CF | cystic fibrosis |
| CGA | calculated gestational age |
| CGA | comprehensive geriatric assessment |
| CHD | congenital heart disease |
| CHF | congestive heart failure |
| CINV | chemotherapy-induced nausea and vomiting |
| CLD | chronic lung disease |
| CML | chronic myelogenous leukemia |
| CMV | cytomegalovirus |
| CNS | central nervous system |
| CPB | cardiopulmonary bypass |
| CPK | creatine phosphokinase |
| CPK-MB | creatine phosphokinase MB isoenzyme |

| | |
|---|---|
| CPR | cardiopulmonary resuscitation |
| CrCl | creatinine clearance |
| CRRT | continuous renal replacement therapy |
| CSF | cerebral spinal fluid |
| CT | computerized tomography |
| CTCAE | common terminology criteria for adverse events |
| CVVH | continuous venovenous hemofiltration |
| CYP | cytochrome P |
| CYP1A2 | cytochrome P450 isoenzyme 1A2 |
| CYP2A4 | cytochrome P450 isoenzyme 2A4 |
| CYP2B6 | cytochrome P450 isoenzyme 2B6 |
| CYP2C19 | cytochrome P450 isoenzyme 2C19 |
| CYP2C9/10 | cytochrome P450 isoenzymes 2C9 and 2C10 |
| CYP2E1 | cytochrome P450 isoenzyme 2E1 |
| CYP3A3/4 | cytochrome P450 isoenzymes 3A3 and 3A4 |
| DAART | dexamethasone: A Randomized Trial |
| DEHP | diethylhexyl phthalate |
| DIC | disseminated intravascular coagulation |
| DKA | diabetic ketoacidosis |
| DPT | Demerol, Phenergan, Thorazine |
| DRESS | drug reaction with eosinophilia and systemic symptoms |
| DVT | deep vein thrombosis |
| DW | dosing weight |
| ECG | electrocardiogram |
| ECMO | extracorporeal membrane oxygenation |
| ED | emergency department |
| EDTA | ethylenediaminetetraacetic acid |
| EEG | electroencephalogram |
| ELBW | extremely low birth weight |
| EMIT | enzyme-multiplied immunoassay technique |
| ESA | erythropoiesis-stimulating agent |
| ET | endotracheal |
| EtOH | ethanol |
| EVA | ethylene vinyl acetate |
| FAB | digoxin immune Fab |
| FDA | Food and Drug Administration |
| FE | fat emulsion |
| FFP | fresh frozen plasma |
| FPIA | fluorescence polarization immunoassay |
| FT4 | free thyroxine |
| GFR | glomerular filtration rate |
| GI | gastrointestinal |
| GM-CSF | granulocyte-macrophage colony-stimulating factor |

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|---|---|
| GVHD | graft versus host disease |
| H1 | histamine-1 receptor antagonist |
| H2 | histamine-2 receptor antagonist |
| Hb | hemoglobin; also Hgb |
| Hct | hematocrit |
| HD | hemodialysis |
| HHV | human herpes virus |
| HIB | *Haemophilus influenzae* type B |
| HIT | heparin-induced thrombocytopenia |
| HITTS | heparin-induced thrombocytopenia with thrombosis syndrome |
| HIV | human immunodeficiency virus |
| HLA | human leukocyte antigen |
| HPLC | high-performance liquid chromatography |
| hr | hour |
| HSV | herpes simplex virus |
| HUS | hemolytic uremic syndrome |
| iNO | inhaled nitric oxide |
| IBW | ideal body weight |
| ICP | intracranial pressure |
| ICU | intensive care unit |
| IE | infective endocarditis |
| IgG | immunoglobulin G |
| IgM | immunoglobulin M |
| IH | idiopathic hyperphosphatasia |
| IM | intramuscular |
| INR | international normalized ratio |
| IO | intraosseous |
| IP | intraperitoneal |
| IQ | intelligence quotient |
| ISMP | Institute for Safe Medication Practices |
| IT | intrathecal |
| ITP | idiopathic thrombocytopenic purpura |
| IV | intravenous |
| IVFE | intravenous fat emulsion |
| IVH | intraventricular hemorrhage |
| IVIG | intravenous immune globulin; intravenous immunoglobulin |
| IVR | in vivo recovery |
| JIA | juvenile idiopathic arthritis |
| LBM | lean body mass |
| LD | loading dose |
| LDH | lactate dehydrogenase |
| LFT | liver function test |
| LGS | Lennox–Gastaut syndrome |

| | |
|---|---|
| MAC | *Mycobacterium avium* complex |
| MAO | monoamine oxidase |
| MAOI | monoamine oxidase inhibitor |
| MAP | mean arterial pressure |
| MI | myocardial infarction |
| MIC | minimum inhibitory concentration |
| min | minute |
| MMR | measles, mumps, and rubella |
| mo | month |
| MRI | magnetic resonance imaging |
| MRSA | methicillin-resistant *Staphylococcus aureus* |
| MTX | methotrexate |
| NAC | n-acetylcysteine |
| NAPA | n-acetylprocainamide |
| NEC | necrotizing enterocolitis |
| NHL | non-Hodgkin lymphoma |
| NIH | National Institutes of Health |
| NMS | neuroleptic malignant syndrome |
| NMTT | n-methyl-thiotetrazole side chain |
| NPO | nothing by mouth |
| NSAID | nonsteroidal anti-inflammatory drug |
| OI | osteogenesis imperfecta |
| OTC | over-the-counter |
| $PaO_2$ | arterial partial pressure of oxygen |
| PALS | pediatric advanced life support |
| PBPC | peripheral blood progenitor cell |
| PCA | partial-controlled analgesia |
| PCA | postconceptional age |
| PCI | percutaneous coronary intervention |
| PCP | phencyclidine |
| PDA | patent ductus arteriosus |
| PE | phenytoin equivalent |
| PID | pelvic inflammatory disease |
| PMA | postmenstrual age |
| PN | parenteral nutrition |
| PNA | postnatal age |
| PO | by mouth |
| PONV | postoperative nausea and vomiting |
| PPHN | persistent pulmonary hypertension of the newborn |
| PPI | proton-pump inhibitor |
| PRN | pro re nata; as needed |
| PT | prothrombin time |

| | |
|---|---|
| PTH | parathyroid hormone |
| PTT | partial thromboplastin time |
| PVC | polyvinyl chloride |
| PVR | pulmonary vascular resistance |
| q | every |
| RBC | red blood cell |
| SA | sinoatrial |
| SBECD | sulfobutyl ether beta-cyclodextrin sodium |
| SC | subcutaneous |
| SCr | serum creatinine |
| SDC | serum digitalis concentration |
| sec | second |
| SIADH | syndrome of inappropriate antidiuretic hormone |
| SLE | systemic lupus erythematosus |
| SSRI | selective serotonin reuptake inhibitor |
| TBW | total body weight |
| TCA | tricyclic antidepressant |
| TDD | total digitalizing dose |
| THC | tetrahydrocannabinol |
| TID | three times daily |
| TNA | total nutrient admixture |
| TNF | tumor necrosis factor |
| TPA | tissue plasminogen activator |
| TPN | total parenteral nutrition |
| TSH | thyroid-stimulating hormone |
| TTP | thrombotic thrombocytopenic purpura |
| UGT | uridine diphosphate–glucuronosyltransferase |
| UOP | urine output |
| USP | United States Pharmacopeia |
| UTI | urinary tract infection |
| VAD | ventricular assist device |
| VPA | valproic acid |
| Vitamin $B_{12}$ | cyanocobalamin |
| VLBW | very low birth weight |
| VTE | venous thromboembolism |
| vWD | von Willebrand disease |
| VZV | varicella-zoster virus |
| WBC | white blood cell |
| wk | week |
| WGA | weeks gestational age |
| yr | year |

# Monographs