ASPEN Enteral Nutrition Handbook Second Edition

Editors

Ainsley Malone, MS, RD, LD, CNSC, FAND, FASPEN

Liesje Nieman Carney, RD, CSP, LDN

Amy Long Carrera, MS, RD, CNSC, CWCMS

Andrew Mays, PharmD, BCNSP, CNSC



The American Society for Parenteral and Enteral Nutrition (ASPEN) is a scientific society whose members are healthcare professionals—physicians, dietitians, nurses, pharmacists, other allied health professionals, and researchers—dedicated to ensuring that every patient receives safe, efficacious, and high-quality patient care.

ASPEN's mission is to improve patient care by advancing the science and practice of clinical nutrition and metabolism.

NOTE: This publication is designed to provide accurate authoritative information with regard to the subject matter covered. It is sold with the understanding that the publisher is not engaged in rendering medical or other professional advice. Trademarked commercial product names are used only for education purposes and do not constitute endorsement by ASPEN.

This publication does not constitute medical or professional advice, and should not be taken as such. To the extent the information published herein may be used to assist in the care of patients, this is the result of the sole professional judgment of the attending health professional whose judgment is the primary component of quality medical care. The information presented herein is not a substitute for the exercise of such judgment by the health professional.

All rights reserved. No part of this may be used or reproduced in any manner whatsoever without written permission from ASPEN. For information, write: ASPEN, 8401 Colesville Road, Suite 510, Silver Spring, MD 20910; call: (301) 587-6315; visit: www.nutritioncare.org; or email: aspen@nutr.org.

1 2 3 4 5 6 7 8 9 10

Copyright © 2019. American Society for Parenteral and Enteral Nutrition.

Print ISBN: 978-1-889622-39-2

eBook ISBN: 978-1-889622-40-8

Suggested citation: Malone A, Carney LN, Carrera AL, Mays A, eds. ASPEN Enteral Nutrition Handbook. 2nd ed. Silver Spring, MD: American Society for Parenteral and Enteral Nutrition; 2019.

Printed in the United States.

Contents

| | Pretace | ٠. ١ |
|---|--|-------|
| | Editors, Contributors, and Reviewers | . vii |
| 1 | Nutrition Screening, Assessment, and Care Plan Development | 1 |
| 2 | Overview of Enteral Nutrition and Patient Selection | . 65 |
| 3 | Enteral Access Devices | . 96 |
| 4 | Enteral Formulas for Adult Patients | 164 |
| 5 | Enteral Formulas for Pediatric Patients | 213 |
| 6 | Enteral Nutrition Orders | 253 |
| 7 | Preparation, Labeling, and Dispensing of Enteral Nutrition | 288 |
| 8 | Administration and Monitoring of Enteral | 225 |

| 9 | Complications of Enteral Nutrition | 354 |
|----|--|-----|
| 10 | Medication Administration with Enteral Nutrition | 402 |
| 11 | Home Enteral Nutrition | 425 |
| | Index | 449 |

iν

ASPEN Enteral Nutrition Handbook



Preface

We are pleased to present the second edition of the ASPEN Enteral Nutrition Handbook, a comprehensive guide with upto-date, specific information on how to safely, effectively, and confidently care for patients receiving enteral nutrition (EN). Like its predecessor, this new edition features best-practice recommendations based on the most current research and provides a wide variety of practical tools and tips to save time and elevate the quality of care.

This edition has been completely revised to reflect the many recent advancements in the science and practice of EN therapy. For example, you will find guidance on using ENFit® devices for tube feeding and medication administration, coverage of the indicators of malnutrition in adult and pediatric patients, and the latest recommendations regarding the use of specialty formulas and blenderized tube feedings. There is a new chapter focused on

the preparation, labeling, and dispensing of EN, and this edition has divided the discussion of adult and pediatric/infant formulas into separate chapters.

The content in this handbook is aligned with ASPEN's evidence-based guidelines, core curriculum, practice recommendations, and standards. The book is an invaluable resource for students and trainees in dietetics, medicine, nursing, and pharmacy. Its "pocket guide" format and easy-to-follow clinical information will appeal to everyone from the novice to the advanced practitioner.

We thank the many contributors and reviewers who shared their knowledge, analysis of the literature, and clinical expertise in the area of EN support. It is our hope that this handbook improves the ordering, administration and safety of EN support to patients.

Ainsley Malone, MS, RD, LD, CNSC, FAND, FASPEN Liesje Nieman Carney, RD, CSP, LDN Amy Long Carrera, MS, RD, CNSC, CWCMS Andrew Mays, PharmD, BCNSP, CNSC

Editors, Contributors, and Reviewers

Editors

Ainsley Malone, MS, RD, LD, CNSC, FAND, FASPEN Clinical Practice Specialist The American Society for Parenteral and Enteral Nutrition Nutrition Support Dietitian Mt. Carmel West Hospital Columbus, OH

Liesje Nieman Carney, RD, CSP, LDN Clinical Dietitian IV, Publication Specialist Children's Hospital of Philadelphia Philadelphia, PA

Amy Long Carrera, MS, RD, CNSC, CWCMS Lead Clinical Dietitian Pacifica Hospital of the Valley Los Angeles, CA Andrew Mays, PharmD, BCNSP, CNSC Clinical Pharmacy Specialist–Nutrition Support University of Mississippi Medical Center Jackson, MS

Contributors

Phil Ayers, PharmD, BCNSP, FASHP Chief, Clinical Pharmacy Services, Mississippi Baptist Medical Center

Clinical Associate Professor, University of Mississippi School of Pharmacy

Jackson, MS

Lillian Harvey Banchik, MD, FACS, CNSC, FASPEN North Shore University Hospital, Manhasset, NY Assistant Clinical Professor, Donald and Barbara Zucker School of Medicine at Hofstra/Northwell Long Island, NY

Sarah Ann Borowicz, MS, RDN, LDN Clinical Pediatric Dietitian Children's Hospital of Philadelphia Philadelphia, PA

Kelly Green Corkins, MS, RD-AP, CSP, LDN, FAND Pediatric/CVICU Clinical Dietitian III Department of Nutrition Therapy, Le Bonheur Children's Hospital

Memphis, TN

Wendy Cruse, MMSc, RDN, CSPCC, CLS, CD Pediatric/NICU Clinical Dietitian Senior Riley Hospital for Children at Indiana University Health Indianapolis, IN Kathryn Drogan, MS, NP, ANP-BC

Nurse Practitioner

University of Rochester

Rochester, NY

Arlene A. Escuro, MS, RD, LD, CNSC, FAND

Advanced Practice II Dietitian

Cleveland Clinic

Cleveland, OH

John C. Fang, MD

Freston Takeda Professor of Medicine

Chief, Division of Gastroenterology, Hepatology, and Nutrition

Department of Internal Medicine, University of Utah Health

Salt Lake City, UT

Audrey Foster, MS, RDN, CNSC

Clinical Dietitian

Children's Hospital of Philadelphia

Philadelphia, PA

Kimberly Gorsuch, BSN, RN

Gastroenterology/Nutrition Metabolic Support Care Manager

Cancer Treatment Centers of America

Comprehensive Care Network Chicago

Zion, IL

June Greaves, RD, CNSC, CDN, LD, LDN

A. Christine Hummell, MS, RD, LD, CNSC

Clinical Dietitian, Advanced Practitioner

Cleveland Clinic

Cleveland, OH

Deb Hutsler, MS, RD, LD Manager of Nutrition Services Akron Children's Hospital Akron, OH

Andrea K. Jevenn, MEd, RD, LD, CNSC Advanced Practice II Dietitian Cleveland Clinic Digestive Disease and Surgical Institute Cleveland, OH

Merin Kinikini, DNP, FNP, RD, CNSC Nurse Practitioner for Metabolic Nutrition Support Clinic, Intermountain Medical Center Adjunct Faculty, University of Utah, College of Nursing Salt Lake City, UT

Mary Kuehl, MS, RD, CNSC Registered Dietitian Shield HealthCare

Carolyn Kusenda, MS, RD, LD, CNSC, CSP Clinical Nutrition Lead Children's Healthcare of Atlanta Atlanta, GA

Rachel Larry, PharmD candidate Student Pharmacist University of Mississippi Jackson, MS

Linda M. Lord, NP, ACNP-BC, CNSC Nutrition Support Nurse Practitioner University of Rochester Medical Center Rochester, NY Beth Lyman, MSN, RN, CNSC
Senior Clinical Program Coordinator, Nutrition Support,
Co-Director of Nutrition Support
Children's Mercy Kansas City
Kansas City, MO

Mary Marian, DCN, RDN, CSO, FAND
Assistant Professor of Practice and Director, Didactic
Program in Dietetics
College of Agriculture and Life Sciences
Department of Nutritional Sciences
University of Arizona
Nutrition Consultant, AZ Oncology
Tucson, AZ

Karen Martin, MA, RDN, LD, FAND Nutrition Support Specialist, Amerita Specialty Infusion Neuromuscular Dictitian, UT Health San Antonio San Antonio, TX

Mary S. McCarthy, PhD, RN, CNSC, FAAN Nurse Scientist Center for Nursing Science & Clinical Inquiry Madigan Army Medical Center Tacoma, WA

Jessica Monczka, RD, CNSC Nutrition Support Specialist Option Care Home Infusion Denver, CO

Katina Rahe, BSN, RN, CPN Enteral Access Team Nursing Program Coordinator Children's Mercy Kansas City Kansas City, MO Christina Ritchey, MS, RD, LD, CNSC Consultant Camarillo, CA

Caroline Steele, MS, RD, CSP, IBCLC, FAND Director, Clinical Nutrition and Lactation Services Children's Hospital of Orange County Orange, CA

Jacqueline Sullivan, MS, RD Clinical Dietitian SSM St Mary's Hospital, Nutrition Services Madison, WI

Reviewers

Anastasia E. Arena, BS, RD, LDN
Clinical Nutrition Specialist
Critical Care Medicine/Home Parenteral Nutrition
Program
Boston Children's Hospital
Boston, MA

Meg Begany, RD, CSP, CNSC, LDN Neonatal Dietitian/Nutrition Support Service Specialist Children's Hospital of Philadelphia Philadelphia, PA

Stephanie Dobak, MS, RD, LDN, CNSC Clinical Dietitian Thomas Jefferson University Hospital Philadelphia, PA

June Garrett, MS, RDN-AP, CNSC, CLC Clinical Dietitian Children's Hospital of Los Angeles Los Angeles, CA Peggi Guenter, PhD, RN, FAAN, FASPEN Senior Director of Clinical Practice, Quality, and Advocacy American Society for Parenteral and Enteral Nutrition Silver Spring, MD

Lauren M. Hudson, MS, RD, LDN Director, Clinical Nutrition Support Services Hospital of the University of Pennsylvania Philadelphia, PA

Carol Ireton-Jones, PhD, RDN, LD, CNSC, FASPEN Nutrition Therapy Specialist Good Nutrition for Good Living Dallas, TX

Rachelle Kirsch, RD, LD, CNSC Clinical Dietitian—Trauma Baylor University Medical Center Dallas, TX

Mark Klang, MS, PhD, RPh, BCNSP Core Manager, Research Pharmacy Memorial Sloan Kettering Cancer Center New York, NY

Carolyn Kusenda, MS, RD, CNSC, CSP, LD Clinical Nutrition Lead Children's Healthcare of Atlanta Atlanta, GA

Carol McGinnis, DNP, APRN-CNS, CNSC Clinical Nurse Specialist, Nutrition Support Sanford USD Medical Center Sioux Falls, SD Kris M. Mogensen, MS, RD-AP, LDN, CNSC

Team Leader Dietitian Specialist

Department of Nutrition

Brigham and Women's Hospital

Boston, MA

Susan Roberts, DCN, RDN, LD, CNSC, FAND

Area Director of Clinical Nutrition/Dietetic Internship Director

Baylor Scott & White Health/Aramark Healthcare Dallas, TX

Carol J. Rollins, MS, RD, PharmD, CNSC, BCNSP, FASPEN

Clinical Professor

University of Arizona, College of Pharmacy, Department of Pharmacy Practice and Science

Tucson, AZ

David S. Seres, MD, ScM, FASPEN

Director of Medical Nutrition, Associate Clinical Ethicist, and Associate Professor of Medicine

Institute of Human Nutrition

Columbia University Irving Medical Center

NewYork-Presbyterian Hospital

New York, NY

Wednesday Marie A. Sevilla, MD, MPH, CNSC

Assistant Professor of Pediatrics

UPMC Children's Hospital of Pittsburgh

Division of Pediatric Gastroenterology, Hepatology and Nutrition

Pittsburgh, PA

Allison Shaffer, RD, LDN Registered Dietitian/Clinical Nutrition Specialist Boston Children's Hospital Boston, MA

Erin Sullivan, RD, LDN Pediatric Critical Care Dietitian The Children's Hospital of Philadelphia Philaelphia, PA

Laura J. Szekely, MS, RD, LD Supervisor, Nutrition Services Akron Children's Hospital Akron, OH

Abby Wood, MS, RDN, CSO, LD, CNSC Clinical Dietitian Specialist Baylor University Medical Center Dallas, TX