SIXTH EDITION

BREASTFEEDING and HUMAN LACTATION

Karen Wambach, PhD, RN, IBCLC, FILCA, FAAN
Professor
School of Nursing
University of Kansas
Kansas City, Kansas, USA

Becky Spencer, PhD, RN, IBCLC
Associate Professor
College of Nursing
Texas Woman’s University
Denton, Texas, USA
Substantial discounts on bulk quantities of Jones & Bartlett Learning publications are available to corporations, professional associations, and other qualified organizations. For details and specific discount information, contact the special sales department at Jones & Bartlett Learning via the above contact information or send an email to specialsales@jblearning.com.

Copyright © 2021 by Jones & Bartlett Learning, LLC, an Ascend Learning Company

All rights reserved. No part of the material protected by this copyright may be reproduced or utilized in any form, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission from the copyright owner.

The content, statements, views, and opinions herein are the sole expression of the respective authors and not that of Jones & Bartlett Learning, LLC. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not constitute or imply its endorsement or recommendation by Jones & Bartlett Learning, LLC, and such reference shall not be used for advertising or product endorsement purposes. All trademarks displayed are the trademarks of the parties noted herein. Breastfeeding and Human Lactation, Sixth Edition, is an independent publication and has not been authorized, sponsored, or otherwise approved by the owners of the trademarks or service marks referenced in this product.

There may be images in this book that feature models; these models do not necessarily endorse, represent, or participate in the activities represented in the images. Any screenshots in this product are for educational and instructive purposes only. Any individuals and scenarios featured in the case studies throughout this product may be real or fictitious, but are used for instructional purposes only.

The authors, editor, and publisher have made every effort to provide accurate information. However, they are not responsible for errors, omissions, or for any outcomes related to the use of the contents of this book and take no responsibility for the use of the products and procedures described. Treatments and side effects described in this book may not be applicable to all people; likewise, some people may require a dose or experience a side effect that is not described herein. Drugs and medical devices are discussed that may have limited availability controlled by the Food and Drug Administration (FDA) for use only in a research study or clinical trial. Research, clinical practice, and government regulations often change the accepted standard in this field. When consideration is being given to use of any drug in the clinical setting, the healthcare provider or reader is responsible for determining FDA status of the drug, reading the package insert, and reviewing prescribing information for the most up-to-date recommendations on dose, precautions, and contraindications, and determining the appropriate usage for the product. This is especially important in the case of drugs that are new or seldom used.

18997-1

Production Credits
VP, Product Management: Amanda Martin
Director of Product Management: Matthew Kane
Product Manager: Teresa Malmberg
Product Assistant: Melina Leon
Project Specialist: Kelly Sylvester
Project Specialist, Navigate: Kelly Sylvester
Digital Project Specialist: Angela Dooley
Senior Marketing Manager: Lindsay White
Product Fulfillment Manager: Wendy Kilborn

Library of Congress Cataloging-in-Publication Data
Description: Sixth edition. | Burlington, Massachusetts : Jones & Bartlett Learning, [2021]
Identifiers: LCCN 2019015369 | ISBN 9781284151565 (hardback)
Subjects: | MESH: Breast Feeding | Infant Nutritional Physiological Phenomena
Lactation | Milk, Human
Classification: LCC R216 | NLM WS 125 | DDC 649/.33--dc23
LC record available at https://lccn.loc.gov/2019015369

6048
Printed in the United States of America
23 22 21 20 19 10 9 8 7 6 5 4 3 2 1
Brief Contents

Preface xi
Acknowledgments xiii
Contributors xiv

SECTION ONE  HISTORICAL AND WORK PERSPECTIVES 1

Chapter 1 The International Board Certified Lactation Consultant® (IBCLC®) and the Healthcare Team .............. 3
Chapter 2 Breastfeeding and Lactation: Roots and Wings .............. 21

SECTION TWO  ANATOMIC AND BIOLOGICAL IMPERATIVES 47

Chapter 3 Anatomy and Physiology of Lactation ........................................ 49
Chapter 4 The Composition and Specificity of Human Milk .................... 85
Chapter 5 Drug Therapy and Breastfeeding ............................................. 127
Chapter 6 Viral Infections and Breastfeeding ........................................ 159

SECTION THREE  PRENATAL, PERINATAL, AND POSTNATAL PERIODS 175

Chapter 7 Perinatal and Intrapartum Care ............................................. 177
Chapter 8 Newborn Assessment .......................................................... 215
Chapter 9 Postpartum Care ................................................................. 247
Chapter 10 Breast-Related Problems .................................................... 281
Chapter 11 Low Intake in the Breastfed Infant: Maternal and Infant Considerations .................................................... 313
Chapter 12  Jaundice and the Breastfed Baby ............................. 355
Chapter 13  Breast Pumps and Other Technologies ...................... 365
Chapter 14  The Use of Human Milk and Breastfeeding in the Neonatal Intensive Care Unit ........................................... 397
Chapter 15  Donor Milk Banking ................................................. 443

SECTION FOUR  BEYOND POSTPARTUM 469

Chapter 16  Maternal Nutrition and Breastfeeding ....................... 471
Chapter 17  Women’s Health and Breastfeeding .......................... 481
Chapter 18  Maternal Employment and Breastfeeding .................... 549
Chapter 19  Child Health .......................................................... 577
Chapter 20  The Ill Child: Breastfeeding Implications ..................... 619

SECTION FIVE  SOCIOCULTURAL AND RESEARCH ISSUES 675

Chapter 21  Research, Theory, and Lactation ............................... 677
Chapter 22  Breastfeeding Education .......................................... 713
Chapter 23  The Cultural Context of Breastfeeding ....................... 739
Chapter 24  The Familial and Social Context of Breastfeeding ............ 759

Index 787
## Contents

**Preface** .......................... xi
**Acknowledgments** .................. xiii
**Contributors** ........................ xiv

### SECTION ONE  Historical and Work Perspectives  1

**Chapter 1** The International Board Certified Lactation Consultant® (IBCLC®) and the Healthcare Team ........... 3

- History .......................................... 4
- Do IBCLCs Make a Difference? ............ 5
- Pathways to Become Certified as an IBCLC ........ 5
- Formal and Continuing Education Programs for IBCLCs and Lactation Support Providers ........ 7
- Practice-Guiding Documents ............. 7
- Ethics ........................................... 8
- Legal Issues .................................... 8
- Avoid Civil Liability ......................... 9
- Confidentiality ............................... 9
- Hospital Lactation Services ............. 9
- Managing a Hospital Lactation Service .......... 113
- Orientation and Documentation .......... 14
- Education, Advocacy, and Collaboration ........ 14
- Professional Lactation Care and Volunteer or Paid Peer Counselors .................. 15
- Breastfeeding Support in the Community .......... 15
- Summary ..................................... 16
- Key Concepts .................................. 16
- References .................................... 17

**Chapter 2** Breastfeeding and Lactation: Roots and Wings .......... 21

- Introduction ................................... 21
- Human Evolution: Shared Parenting and Lactation .................. 22
- United States Policy ........................... 33

**Chapter 3** Anatomy and Physiology of Lactation ............. 49

- Introduction ................................... 49
- Mammogenesis ............................... 49
- Breast Structure ............................... 50
- Pregnancy ..................................... 54
- Clinical Implications: Mother .............. 63
- Newborn Oral Development .................. 65
- Sucking ........................................ 67
- Frequency of Feedings ...................... 72
- Summary ...................................... 73
- Key Concepts .................................. 74
- Internet Resources ............................ 75
- References .................................... 75
- Appendix 3-A ................................. 80
- References .................................... 83

**Chapter 4** The Composition and Specificity of Human Milk ............. 85

- Milk Synthesis and Maturational Changes .......... 86
- Energy, Volume, and Growth .................. 87
- Nutritional Values ............................. 92
- Bioactive Components .......................... 99
- The Immune System ............................. 104
- Preterm Milk .................................... 107
## Contents

**Anti-Infective Properties** .......................................................... 107

**Implications for Clinical Practice** ........................................... 114

**Summary** .................................................................................. 115

**Key Concepts** ........................................................................... 115

**Acknowledgment** .................................................................... 116

**References** ............................................................................... 116

**Chapter 5  Drug Therapy and Breastfeeding** ................................. 127

**Introduction** ............................................................................... 127

**The Alveolar Subunit** ................................................................. 128

**Drug Transfer into Human Milk** .............................................. 129

**Calculating Infant Exposure** ..................................................... 132

**Effect of Medications on Milk Production** ................................. 134

**Review of Selected Drug Classes** ............................................ 137

**Illicit Substances** ....................................................................... 149

**Radioactive Agents** .................................................................. 150

**Summary** ................................................................................... 150

**Key Concepts** ............................................................................ 151

**References** ............................................................................... 151

**Chapter 6  Viral Infections and Breastfeeding** ............................... 159

**Introduction** ............................................................................... 159

**Human Immunodeficiency Virus** ............................................. 160

**Herpes Simplex Virus** ............................................................... 162

**Varicella-Zoster Virus (Chickenpox/Varicella/ Zoster/Shingles)** .... 164

**Cytomegalovirus** ....................................................................... 165

**Rubella** .................................................................................... 166

**Hepatitis B** ............................................................................... 166

**Hepatitis C** ............................................................................... 168

**Human T-Cell Lymphotropic Viruses** ....................................... 168

**Arboviruses** .............................................................................. 169

**Ebola Virus** ............................................................................... 170

**Implications for Practice** .......................................................... 170

**Acknowledgments** ................................................................... 170

**Summary** ................................................................................... 171

**Key Concepts** ............................................................................ 171

**Internet Resources** ................................................................... 172

**References** ............................................................................... 172

## SECTION THREE  Prenatal, Perinatal, and Postnatal Periods 175

**Chapter 7  Perinatal and Intrapartum Care** ................................... 177

**Breastfeeding Preparation** ........................................................ 177

**Early Feedings** ......................................................................... 178

**Stressful Births and Other Adverse Practices** ............................. 181

**Postbirth Care of the Newborn** ................................................ 182

**Normal Newborn Sleep and Eating Patterns** ............................ 183

**Pain Medications** ...................................................................... 185

**Feeding Positions** ..................................................................... 186

**The Infant Who Has Not Latched On** ....................................... 188

**Late-Preterm Infants** ................................................................. 193

**Breast-Engorgement** ................................................................. 199

**Breast Edema** ........................................................................... 200

**Hand Expression** ...................................................................... 201

**Clinical Implications** ............................................................... 202

**The Baby-Friendly Hospital Initiative** ....................................... 205

**Acknowledgment** .................................................................... 206

**Summary** ................................................................................... 206

**Key Concepts** ............................................................................ 206

**Internet Resources** ................................................................... 207

**References** ............................................................................... 208

**Appendix 7-A** ............................................................................. 213

**Appendix 7-B** ............................................................................. 214

**Chapter 8  Newborn Assessment** ................................................. 215

**Introduction** ............................................................................... 215

**Perinatal History** ....................................................................... 215

**Gestational Age Assessment** .................................................... 215

**Indicators of Effective Breastfeeding and Assessment Scales** .... 221

**Physical Assessment** ............................................................... 226

**Head** ....................................................................................... 232

**Behavioral Assessment** ........................................................... 237

**Neonatal Abstinence Syndrome** ............................................. 241
Chapter 9 Postpartum Care

- Immediate Postbirth Events
- First Weeks: Principles and Expectations
- Common Problems in the Early Days and Weeks
- Supplementation Guidelines and Cautions
- Nipple Pain
- Engorgement + Milk Stasis = Involution
- Milk Supply/Milk Production
- Breast Massage
- Nausea and Other Negative Feelings During the Milk-Ejection
- Clothing, Leaking, Bras, and Breast Pads
- Infant Concerns
- Multiple Infants
- Sleeping, SIDS, and Bed-Sharing
- Clinical Implications
- Summary
- Key Concepts
- Internet Resources
- References

Chapter 10 Breast-Related Problems

- Introduction
- Nipple Variations
- Plugged Ducts
- Mastitis
- Breast Abscess
- Dermatoses of the Breast
- Candidiasis (Thrush)
- Other Breast Pain
- Milk Blister
- Mammoplasty
- Breast Lumps and Surgery
- Galactoceles
- Fibrocystic Changes of the Breast
- Bleeding from the Breast
- Breast Cancer
- Clinical Implications
- Acknowledgment
- Summary
- Key Concepts
- Internet Resources
- References

Chapter 11 Low Intake in the Breastfed Infant: Maternal and Infant Considerations

- Introduction
- Global Standards for Optimal Growth: The WHO Child Growth Standards
- The Relationship of Newborn Weight Loss to Onset of Lactogenesis II and Other Peripartum Risk Factors
- Initial Newborn Weight Loss and Early Weight Gain
- Low Intake and Low Milk Supply: Definitions and Incidence of Occurrence, Confusing Terminology, Limited Data, and Nonstandardized Research
- Abnormal Patterns of Growth: The Baby Who Appears Healthy
- Abnormal Patterns of Growth: The Baby with Obvious Illness
- Maternal Considerations: The Mother Who Appears Healthy
- Maternal Considerations: Obvious Illness
- History, Physical Exam, and Differential Diagnosis
- Clinical Management
- Special Techniques for Management of Low Intake or Low Supply
- Acknowledgment
- Summary
- Key Concepts
- Internet Resources
- References

Chapter 12 Jaundice and the Breastfed Baby

- Etiologic and Epidemiologic Overview of Jaundice
- Medical Diagnosis of the Jaundiced Infant
- Assessment of Jaundice
- Management of Hyperbilirubinemia
- Acknowledgment
- Summary
- Key Concepts
Chapter 17 Women’s Health and Breastfeeding ............... 481

Postpartum Health and Care .................................. 481
Lactation, Fertility, Sexuality, and Contraception .......... 483
Fertility ......................................................... 484
Postpartum Well-Being and Sexual Health ................. 490
Women’s Health Across the Childbearing Years .......... 495
Acute Illnesses and Infections ................................ 509
Chronic Illnesses ............................................. 514
Mood Disorders During Lactation ............................ 522
Autoimmune Diseases ....................................... 526
Physically Challenged Mothers ............................... 530
Sensory Challenged Mothers ................................ 533
Epilepsy (Seizure Disorders) ................................ 533
Surgery ......................................................... 534
Transplants ....................................................... 535
Donating Blood ................................................. 535
The Impact of Maternal Illness and Hospitalization ...... 535
Acknowledgment .............................................. 536
Summary ....................................................... 536
Key Concepts .................................................. 536
Internet Resources ............................................ 538
References ...................................................... 538

Chapter 18 Maternal Employment and Breastfeeding ........ 549

Introduction .................................................... 549
Historical Perspective and Statistics on Maternal Employment 549
The Effect of Work on Breastfeeding ......................... 550
Facilitators and Barriers to Breastfeeding in the Workplace 551
Individual Strategies to Manage Breastfeeding and Work . 552
Special Issues Related to Returning to Work ................ 555
Workplace Strategies to Support Breastfeeding and Work . 560
Community Strategies to Support Breastfeeding and Work . 565
National and Global Strategies in Promoting and Supporting Breastfeeding 566
Clinical Implications .......................................... 569

Chapter 19 Child Health ................................. 577

Developmental Outcomes and Infant Feeding ............. 577
Oxytocin and Breastfeeding .................................. 581
Growth and Development ..................................... 581
Theories of Development ..................................... 585
Clinical Implications .......................................... 595
Immunizations .................................................. 596
Car Seat Safety ................................................. 600
Vitamin D and Rickets ........................................ 600
Dental Health and Orofacial Development ................. 601
Solid Foods ..................................................... 603
Obesity ........................................................ 607
Weaning ........................................................ 609
Long-Term Breastfeeding .................................... 609
Implications for Practice ...................................... 610
Acknowledgment .............................................. 610
Summary ....................................................... 610
Key Concepts .................................................. 610
Internet Resources ............................................ 611
References ...................................................... 611

Chapter 20 The Ill Child: Breastfeeding Implications ............. 619

Team Care for the Child with Feeding Difficulties .......... 619
Feeding Behaviors of the Ill Infant/Child .................... 620
What to Do If Weight Gain Is Inadequate ................. 621
Pain Management Concerns ................................ 625
Breastfeeding Care of the Hospitalized Infant ............ 625
Perioperative Care of the Breastfeeding Infant/Child .... 627
Emergency Room .............................................. 627
Care of Children with Selected Conditions ............... 628
Alterations in Neurologic Functioning ..................... 634
Congenital Heart Disease ................................... 639
Oral/Facial Anomalies ....................................... 641
Gastrointestinal Anomalies and Disorders ................. 646
Metabolic Dysfunction ....................................... 651
Contents

Allergies .................................................. 657
Food Intolerance ........................................ 658
Neonatal Abstinence Syndrome ................. 659
Psychosocial Concerns ............................... 659
Acknowledgment ..................................... 663
Summary .................................................. 663
Key Concepts .......................................... 663
Internet Resources .................................... 664
References .............................................. 664

SECTION FIVE  Sociocultural and Research Issues 675

Chapter 21 Research, Theory, and Lactation .......... 677
Introduction ............................................ 677
Theories Related to Lactation Practice ............. 677
Origins of Research Methodologies ............... 681
Types of Research Methods ....................... 682
Elements of Research ............................... 687
Application of Methods to Qualitative Approaches .......... 693
Application of Methods to Quantitative Approaches ...... 695
Data Analysis ........................................... 699
Evaluating Research for Use in Practice .......... 703
Using Research in Clinical Practice ............... 705
Summary .................................................. 706
Key Concepts .......................................... 707
Internet Resources .................................... 708
References .............................................. 708

Chapter 22 Breastfeeding Education ............... 713
Introduction ............................................ 713
Factors Creating the Need for Breastfeeding and Lactation Education .......... 713
The Changing Landscape of Breastfeeding Education .......... 714
Breastfeeding Programs for Healthcare Professionals ........................................ 718
The Breastfeeding Team .............................. 720
Parent Education ..................................... 723
Adult Learning Principles and Education ......... 727
Curriculum Development ............................ 729
Teaching Strategies .................................. 730
Educational Materials ............................... 732
Summary .................................................. 734
Key Concepts .......................................... 734
Resources .............................................. 735
References .............................................. 735

Chapter 23 The Cultural Context of Breastfeeding .......... 739
Introduction ............................................ 739
The Dominant Culture ................................ 740
Ethnocentrism Versus Relativism and Cultural Sensitivity .......... 741
Cultural Competence ................................ 741
Assessing Cultural Practices ....................... 742
Language Barriers .................................... 744
The Effects of Culture on Breastfeeding .......... 745
Colostrum Discarding, Prelactal Feeding, and Timely Initiation of Breastfeeding .......... 748
Maternal Foods ........................................ 751
Weaning .................................................. 753
Implications for Practice ......................... 754
Summary .................................................. 755
Key Concepts .......................................... 755
Internet Resources .................................... 755
References .............................................. 756

Chapter 24 The Familial and Social Context of Breastfeeding .......... 759
Family Forms and Function ....................... 759
Family Theory ........................................ 760
Social Factors That Influence Breastfeeding .......... 760
Fathers ................................................. 763
The Adolescent Mother ......................... 767
The Adoptive Mother and Family .......... 769
The Low-Income Family ........................... 770
Breastfeeding During Pregnancy and Tandem Nursing .......... 775
The Downside of Family Experience .......... 776
Summary .................................................. 780
Key Concepts .......................................... 780
Internet Resources .................................... 780
Other Resources ...................................... 780
References .............................................. 781

Index ..................................................... 787
Preface

This book is dedicated to Dr. Janice (Jan) Riordan, the founding editor of *Breastfeeding and Human Lactation* and pioneer in the field of human lactation and the lactation consultant profession. Jan passed away on September 17, 2018. I, like many others, miss her very much, but I am eternally grateful to her for her longtime mentoring and the opportunity to serve as an author and editor of *Breastfeeding and Human Lactation*. Jan was an extraordinary scholar who abundantly gave to the lactation and breastfeeding clinical, education, and research community, both nationally and internationally. Professionally, she was a nurse, an international board-certified lactation consultant (IBCLC), a nurse educator, and a breastfeeding researcher with a specialty in instrument development and testing. She was a prolific author, publishing many books and papers in several outstanding peer-reviewed journals, including the *Journal of Obstetric, Gynecologic and Neonatal Nursing* (JOGNN) and the *Journal of Human Lactation*. Jan was a fierce breastfeeding advocate and professional whose efforts were widely demonstrated through La Leche League; Wichita State University, where she taught in the School of Nursing for 23 years and established the Janice M. Riordan Distinguished Professorship in Maternal Child Health; the International Lactation Consultant Association, where she led the research committee and served on the ILCA board of directors; and the International Board of Lactation Consultant Examiners, as a founding member of this important credentialing organization. Her beliefs and values related to breastfeeding and lactation stemmed from her nursing background as well as her personal experiences as a mother of six children. We miss you, Jan, and your love of the lactation and breastfeeding discipline will live on for years to come in *Breastfeeding and Human Lactation*, the classic evidence-based bible of lactation and breastfeeding.

In this sixth edition, I welcome Becky Spencer as the new coeditor of *Breastfeeding and Human Lactation*. Becky comes to the coeditor position from Texas Woman's University School of Nursing, where she was recently promoted to associate professor. Becky teaches in the master's and doctoral programs at TWU and conducts breastfeeding research, with a focus on disparities in breastfeeding, especially among African American women. Becky's expertise in qualitative research and excellent writing and editing skills (exhibited in the recently published *Core Curriculum for Interdisciplinary Lactation Care*) will serve her well in her role. Welcome, Becky!

Changes to this Sixth Edition are once again plentiful and, it is hoped, useful to our readers. We now have 24 chapters in the book; we have included again a chapter on maternal nutrition in breastfeeding, authored by Alicia Simpson. Extensive changes and revisions were made to some chapters while fewer revisions/changes were made to others. We are fortunate that the evidence underlying the science of breastfeeding and human lactation continues to grow, and we have done our best to include such evidence in the chapters. We welcome several new contributors to the book; many took on chapters authored by Dr. Riordan and retiring authors or joined existing senior authors. Our goal was to include knowledgeable experts, and we believe we have done so.

Since the last edition of the book, advances were again made in the promotion of and support for breastfeeding in the United States. Following in the footsteps of the Best Fed Beginnings program, the EMPower hospital-based quality improvement initiative was implemented between September 2014 and September 2018 to focus on maternity care practices leading to Baby-Friendly designation. Implemented in partnership with the Carolina Global Breastfeeding Institute and Population Health Improvement Partners and with guidance from Baby-Friendly USA, the Centers for Disease Control and Prevention–funded initiative included 91 hospitals in 23 states and led to the designation of 66 new Baby-Friendly hospitals.

As lactation care providers, educators, and researchers, we have an obligation to do our part in...
Preface

enhancing support for breastfeeding mothers. We hope that our book provides the evidence and information on practical application of that evidence in support of breastfeeding mothers.

Birth practices affect lactation. Thus, this edition again contains considerable content on obstetric issues, especially the importance of skin-to-skin care and keeping mothers and babies together 24 hours a day during the birth hospitalization. Maternity practices and obstetric intervention that impact breastfeeding have retained considerable attention from professional healthcare organizations. This is good news for efforts to support breastfeeding initiation and continuation. Examples include the American College of Obstetrics and Gynecology Committee Opinion #756, Optimizing Support for Breastfeeding as Part of Obstetric Practice, and the Association of Women’s Health, Obstetric and Neonatal Nurses Practice Brief #4, Breastfeeding Recommendations for Women Who Receive Medication-Assisted Treatment for Opioid Use Disorders.

As is true of earlier editions, the sixth edition of this text has a clear clinical focus. Nearly every chapter contains a clinical implications section. Important concepts discussed in chapters are summarized at the end of each chapter—a feature that makes studying easier. Throughout the book are new references deemed by the authors to be the most important from the vastly expanded research and clinical literature. Some older references—which introduced then-new ideas that are now accepted common knowledge—have been removed to make room for the new.

Section 1 contrasts the past and present relative to breastfeeding and the International Board Certified Lactation Consultant (IBCLC)*. Chapter 1 concentrates on the work of the present-day IBCLC and the healthcare team who support lactation and breastfeeding, and it addresses work-related issues of lactation consulting, such as staffing. Chapter 2, with its new title, "Breastfeeding and Lactation: Roots and Wings," presents a historical context of breastfeeding within the greater context of infant feeding practices. Paige Hall Smith and Ellen Chetwynd are new authors of this chapter and have eloquently included an international focus and a sociocultural context of breastfeeding past and present as well as visions for the future.

Section 2 focuses on basic anatomic and biologic imperatives of lactation. Clinical application of techniques must be based on a clear understanding of the relationships among form, function, and biological constructs. Researchers continue to find and validate the amazing properties in human milk, as described in the newly named Chapter 4, “The Composition and Specificity of Human Milk.”

Section 3 remains the clinical heart of the book and describes the basics of what to do, when to do it, and how to do it when one assists the lactating mother. Section 3 thus centers on the perinatal period in the birth setting and concerns during the postpartum period following the family’s return home—notably, breast problems, neonatal jaundice, and infant weight gain. This section also addresses special needs of preterm and ill babies and their mothers, and it presents a critical evaluation of breastfeeding devices and recommends how and when they can be most appropriately used. It concludes with a review of the development and current activities of human milk banking.

The first part of Section 4 focuses on the mother: the mother’s health and returning to work. The topics then turn to the infant’s health and special health needs. The techniques of infant assessment are explained and demonstrated with photographs.

Section 5 begins with a careful look at research—how it is conducted, why ongoing research is needed, how research findings can be applied in clinical settings, and what theories are related to lactation practice. The principles of education, the cornerstone of clinical practice, are explored next. The book concludes with chapters on culture’s effect on breastfeeding and the sociological context of the breastfeeding family functions.

To avoid linguistic confusion, the book uses the following conventions: The masculine pronoun is used to denote the infant or child throughout the text as a matter of convenience to distinguish the child from the breastfeeding mother; nurses, lactation consultants, and other healthcare workers are referred to by feminine pronouns, although we recognize that men serve in all healthcare professions.
We are grateful to all current and past researchers and clinicians for providing the foundation for our breastfeeding knowledge and to those institutions that encouraged and supported us in writing the book over the years: the University of Kansas School of Nursing in Kansas City, Kansas; the Wichita State University School of Nursing during the years of Jan Riordan’s editorship; and currently, Texas Woman’s University, Denton, Texas.

Finally, we would like to thank our families for their help and encouragement over the years:

The Wambach family: Bill; Jackie, Brian, and Bri-anne; and Nathan, Sugar, Logan, and Samantha.

The Spencer Family: Phil, Erin, Owen, and Nathan.
Contributors

Teresa E. Baker, MD, FACOG
Professor
Department of Obstetrics and Gynecology
Texas Tech University Health Sciences Center
Amarillo, Texas, USA

Suzanne Bentley, DNP, CNM, APRN, IBCLC
Clinical Nurse Specialist
The University of Kansas Health System
Kansas City, Kansas, USA

Elizabeth C. Brooks, JD, IBCLC, FILCA
Private Practice Lactation Consultant
Wyndmoor, Pennsylvania, USA

Caroline J. Chantry, MD
Professor Emerita
Clinical Pediatrics
University of California Davis HEALTH
Sacramento, California, USA

Ellen Chetwynd, PhD, MPH, BSN, IBCLC
Research Scientist
Center for Women’s Health & Wellness
School of Health and Human Sciences, UNC
Greensboro
Greensboro, North Carolina, USA
and
Research Scientist of Clinical Lactation
Department of Food, Bioprocessing and Nutrition Sciences
North Carolina State University
Raleigh, North Carolina, USA

Eva Chevreux, MS, APRN, IBCLC
Family Nurse Practitioner
Department of Pediatrics
The University of Kansas Health System
Kansas City, Kansas, USA

Jolynn Dowling, MSN, APRN, NNP-BC, IBCLC
Associate Educator, Janice M. Riordan Distinguished Professorship in Maternal Child Health
School of Nursing
Wichita State University
Wichita, Kansas, USA

Valerie J. Flaherman, MD, MPH, IBCLC
Associate Professor of Pediatrics
Associate Professor of Epidemiology and Biostatistics
University of California, San Francisco
San Francisco, California, USA

Jimi Francis, BS, MS, PhD, IBCLC, RLC, RDN, LD
Assistant Professor
Health and Kinesiology
University of Texas at Tyler
Tyler, Texas, USA

Catherine Watson Genna, BS, IBCLC
Private Lactation Consultant Practice
New York, New York, USA

Thomas W. Hale, PhD
University Distinguished Professor
Department of Pediatrics
Texas Tech University Health Sciences Center
Amarillo, Texas, USA

Kay Hoover, MEd, IBCLC, FILCA
Lactation Consultant
Riddle Hospital
Media, Pennsylvania, USA

Frances Jones, RN, MSN, IBCLC
Coordinator, Lactation Services and Provincial Milk Bank
BC Women’s Hospital and Health Centre
Vancouver, British Columbia, CA

Laura R. Kair, MD, MAS, FABM
Assistant Professor, Clinical Pediatrics
Medical Director, Well Newborn Care
University of California, Davis
Sacramento, California, USA
Mary Koehn, PhD, APRN, FACCE  
Associate Education Professor  
School of Medicine  
University of Kansas, Wichita  
Wichita, Kansas, USA  
and  
Associate Professor Emerita  
School of Nursing  
Wichita State University  
Wichita, Kansas, USA  

Rebecca Mannel, MPH, IBCLC, FILCA  
Clinical Assistant Professor  
Department of Obstetrics and Gynecology  
University of Oklahoma Health Sciences Center  
Oklahoma City, Oklahoma, USA  

Barbara Morrison, PhD, RN, NM, FNP, CKC, IBCLC  
Founder & CEO, DrBarbCNM, LLC  
Traverse City, Michigan, USA  

Sallie Page-Goertz, MN, APRN, IBCLC, FILCA  
Clinical Associate Professor  
Department of Pediatrics  
School of Medicine  
University of Kansas  
Kansas City, Kansas, USA  

Wilaiporn Rojjanasrirat, PhD, RNC, IBCLC  
Professor, Director of Research and Scholarship  
School of Nursing  
Graceland University  
Independence, Missouri, USA  

Hilary Rowe, BSc (Pharm), PharmD, ACPR  
Clinical Pharmacy Specialist, Maternal Fetal Medicine  
Neonatal and Pediatric Pharmacy  
Surrey Memorial Hospital, Fraser Health Authority  
Surrey, British Columbia, CA  

Elizabeth P. Schlaudecker, MD, MPH  
Assistant Professor  
Pediatrics  
Division of Infectious Diseases, Global Health Center  
Cincinnati Children's Hospital Medical Center  
Cincinnati, Ohio, USA  

Alicia Simpson, MS, RD, IBCLC, LD  
Executive Director, Lead Dietician, and Lactation Consultant  
Pea Pod Nutrition and Lactation Support  
Atlanta, Georgia, USA  

Paige Hall Smith, MSPH, PhD  
Professor, Public Health Education  
Director, Center for Women's Health & Wellness  
School of Health and Human Sciences  
University of North Carolina, Greensboro  
Greensboro, North Carolina, USA  

Linda J. Smith, MPH, IBCLC, FACCE, FILCA, FAAN  
Owner and Director  
Bright Future Lactation Resource Centre, Ltd.  
Dayton, Ohio, USA  

Diane L. Spatz, PhD, RN, FAAN  
Professor of Perinatal Nursing and Helen M. Shearer Professor of Nutrition  
School of Nursing  
University of Pennsylvania  
and  
Nurse Researcher and Manager of the Lactation Program  
Children's Hospital of Philadelphia  
Philadelphia, Pennsylvania, USA  

Becky Spencer, PhD, RN, IBCLC  
Associate Professor  
College of Nursing  
Texas Woman's University  
Denton, Texas, USA  

Marsha Walker, RN, IBCLC  
Executive Director  
National Alliance for Breastfeeding Advocacy  
Weston, Massachusetts, USA  

Jenny Walters, MPH, IBCLC  
Lactation Consultant  
The University of Kansas Health System  
Kansas City, Kansas, USA  

Karen Wambach, PhD, RN, IBCLC, FILCA, FAAN  
Professor, Director PhD Program, Co-Coordinator BSN Honors Program  
School of Nursing  
University of Kansas  
Kansas City, Kansas, USA  

Alice Li Ching Wang, BSc (Pharm), ACPR  
Clinical Pharmacist  
Surrey Memorial Hospital, Fraser Health  
Surrey, British Columbia, CA  

Elaine Webber, DNP, PPCNP-BC, IBCLC  
Associate Clinical Professor  
School of Nursing  
University of Detroit Mercy  
Detroit, Michigan, USA  

Mary Koehn, PhD, APRN, FACCE  
Associate Education Professor  
School of Medicine  
University of Kansas, Wichita  
Wichita, Kansas, USA  
and  
Associate Professor Emerita  
School of Nursing  
Wichita State University  
Wichita, Kansas, USA  

Rebecca Mannel, MPH, IBCLC, FILCA  
Clinical Assistant Professor  
Department of Obstetrics and Gynecology  
University of Oklahoma Health Sciences Center  
Oklahoma City, Oklahoma, USA  

Barbara Morrison, PhD, RN, NM, FNP, CKC, IBCLC  
Founder & CEO, DrBarbCNM, LLC  
Traverse City, Michigan, USA  

Sallie Page-Goertz, MN, APRN, IBCLC, FILCA  
Clinical Associate Professor  
Department of Pediatrics  
School of Medicine  
University of Kansas  
Kansas City, Kansas, USA  

Wilaiporn Rojjanasrirat, PhD, RNC, IBCLC  
Professor, Director of Research and Scholarship  
School of Nursing  
Graceland University  
Independence, Missouri, USA  

Hilary Rowe, BSc (Pharm), PharmD, ACPR  
Clinical Pharmacy Specialist, Maternal Fetal Medicine  
Neonatal and Pediatric Pharmacy  
Surrey Memorial Hospital, Fraser Health Authority  
Surrey, British Columbia, CA  

Elizabeth P. Schlaudecker, MD, MPH  
Assistant Professor  
Pediatrics  
Division of Infectious Diseases, Global Health Center  
Cincinnati Children's Hospital Medical Center  
Cincinnati, Ohio, USA  

Alicia Simpson, MS, RD, IBCLC, LD  
Executive Director, Lead Dietician, and Lactation Consultant  
Pea Pod Nutrition and Lactation Support  
Atlanta, Georgia, USA  

Paige Hall Smith, MSPH, PhD  
Professor, Public Health Education  
Director, Center for Women's Health & Wellness  
School of Health and Human Sciences  
University of North Carolina, Greensboro  
Greensboro, North Carolina, USA  

Linda J. Smith, MPH, IBCLC, FACCE, FILCA, FAAN  
Owner and Director  
Bright Future Lactation Resource Centre, Ltd.  
Dayton, Ohio, USA  

Diane L. Spatz, PhD, RN, FAAN  
Professor of Perinatal Nursing and Helen M. Shearer Professor of Nutrition  
School of Nursing  
University of Pennsylvania  
and  
Nurse Researcher and Manager of the Lactation Program  
Children's Hospital of Philadelphia  
Philadelphia, Pennsylvania, USA  

Becky Spencer, PhD, RN, IBCLC  
Associate Professor  
College of Nursing  
Texas Woman's University  
Denton, Texas, USA  

Marsha Walker, RN, IBCLC  
Executive Director  
National Alliance for Breastfeeding Advocacy  
Weston, Massachusetts, USA  

Jenny Walters, MPH, IBCLC  
Lactation Consultant  
The University of Kansas Health System  
Kansas City, Kansas, USA  

Karen Wambach, PhD, RN, IBCLC, FILCA, FAAN  
Professor, Director PhD Program, Co-Coordinator BSN Honors Program  
School of Nursing  
University of Kansas  
Kansas City, Kansas, USA  

Alice Li Ching Wang, BSc (Pharm), ACPR  
Clinical Pharmacist  
Surrey Memorial Hospital, Fraser Health  
Surrey, British Columbia, CA  

Elaine Webber, DNP, PPCNP-BC, IBCLC  
Associate Clinical Professor  
School of Nursing  
University of Detroit Mercy  
Detroit, Michigan, USA