

## CONTENTS

<b>Developmental Care State of the Science</b> .....	<b>1</b>
<i>Jana L. Pressler, Carol Spruill Turnage-Carrier, and Carole A. Kenner</i>	
What Distinguishes High-Quality Developmental Care Research? .....	1
Reviewing Developmental Care Research for High-Quality Evidence .....	2
Developmental Care Studies with Internal Validity .....	5
What Forces are Involved in Conducting High-Quality Developmental Care Research? .....	6
Developmental Care Scope of Practice .....	9
Conclusion .....	10
<b>Theoretical Perspective for Developmentally Supportive Care</b> .....	<b>19</b>
<i>gretchen Lawhon and Heidelise Als</i>	
BRAIN DEVELOPMENT .....	20
DEVELOPMENTAL THEORY .....	20
Understanding Newborn Behavior .....	22
NIDCAP .....	23
Supportive Research .....	24
NIDCAP Guidelines for Collaborative Care .....	31
Conclusion .....	36
Acknowledgments .....	37
<b>Quality Indicators: Using the Universe of Developmental Care Model as an Exemplar for Change</b> .....	<b>43</b>
<i>Sharyn Gibbins, Mary Coughlin, and Steven B. Hoath</i>	
The UDC in Depth .....	44
Core Measures .....	49
Changing the NICU Environment .....	49
Core Measures for Developmental Care .....	51
Recommendations for Practice, Education, and Research .....	54
Future Direction .....	55
Conclusion .....	59
<b>The Neonatal Intensive Care Unit Environment</b> .....	<b>63</b>
<i>Maryann Bozzette, Carole Kenner, and Marina Boykova</i>	
Medical Knowledge of Neonatal Behavior .....	64
NICU Equipment .....	64
The Physical Environment .....	65
Developmental Interventions .....	66
Primary and Iatrogenic Medical Complications .....	67
Parents of Critically Ill Infants .....	69
Relationship of the Early Environment to Neonatal Outcomes .....	69
Conclusion .....	71

<b>Caregiving and the Caregiver</b> .....	<b>75</b>
<i>Carol Spruill Turnage-Carrier</i>	
<i>Standard 1: Infant</i>	
Developmental Care Standards .....	75
Caregiving .....	79
Evidence-Based Practice (EBP) and QI .....	84
Teamwork .....	88
Conclusion .....	89
<b>Single-Family Room Design in the Newborn Intensive Care Unit</b> .....	<b>93</b>
<i>Sharon K. Cone and Robert D. White</i>	
<i>Standard 2: Family</i>	
Physical Environment .....	94
Additional Points to Consider for Noise Abatement in the NICU .....	98
Fall Prevention .....	99
Lighting .....	99
Staff .....	99
Conclusion .....	100
<b>Individualized Care: Actions for Individual Staff Members</b> .....	<b>105</b>
<i>Diane D. Ballweg and Ann E. Nepstad</i>	
Individual Actions To Promote Developmentally Supportive Care .....	106
Advancing Unit-Wide Developmental Care .....	112
Conclusion .....	117
<b>Developmental Care and Infant Mental Health: Essential Strategies for Optimal Social-Emotional Care of NICU Families</b> .....	<b>123</b>
<i>Gay Gale and Mary Claire Heffron</i>	
IMH Services: An Overview .....	124
Strategies That Promote Development of Healthy Parent-Child Relationships in the NICU .....	127
Strategies That Prevent or Reduce Developmental and Social-Emotional Risk in the NICU .....	132
Situations Requiring IMH Treatment .....	138
The Reflective Process .....	139
Conclusion .....	140
<b>Partnerships in Care: Mothers and Fathers</b> .....	<b>145</b>
<i>Marina Boykova and Carole Kenner</i>	
Professional-Parent Partnerships and Relationships .....	146
Core Values .....	150
Partnership Benefits .....	151
Parent-Infant Communication .....	152
Transition Ease .....	154
NICU Benefits .....	154

Caregiver Challenges . . . . .	154
Partnership Strategies . . . . .	155
Resources . . . . .	155
Evaluation . . . . .	155
Preterm Parents and Grief Concepts . . . . .	156
Conclusion . . . . .	158
<b>Achieving Success in Supporting Parents and Families in the Neonatal Intensive Care Unit . . . . .</b>	<b>161</b>
<i>Dennis C. Stevens, Carol C. Helseth, and Jesse C. Kurtz</i>	
Family-Centered Care (FCC) in the NICU . . . . .	161
Evolution of Hospital Care for Children . . . . .	164
Parents' Response to Preterm Birth . . . . .	166
Administrative Requirements for FCC Implementation . . . . .	169
Methods to Support Prenatal Family Involvement . . . . .	170
Transport to the NICU . . . . .	171
Delivery Room Management . . . . .	171
Parental Presence During Resuscitation and Invasive Procedures . . . . .	172
Kangaroo Care. . . . .	174
NICU Environmental Modifications to Support Development and Family Care . . . . .	174
Dealing with Death in the NICU . . . . .	181
Acknowledgments . . . . .	184
<b>Critical Periods of Development . . . . .</b>	<b>191</b>
<i>Carole A. Kenner, Marilyn J. Lotas, Joyce L. King, and Cheryl King</i>	
Weeks 1–8: Fertilization Through the Embryonic Stage . . . . .	191
Development of the Placenta . . . . .	192
Development of the Placenta and Fetal Membranes . . . . .	193
Weeks 9–40: Fetal Development . . . . .	200
Conclusion . . . . .	206
Prenatal Factors Influencing Development . . . . .	209
<b>Factors Influencing Development . . . . .</b>	<b>209</b>
<i>Susan Blackburn</i>	
Perinatal Factors Influencing Development . . . . .	220
Postnatal Influences on Development . . . . .	222
Conclusion . . . . .	227
<b>The Dynamic Continuum of Motor and Musculoskeletal Development: Implications for Neonatal Care and Discharge Teaching . . . . .</b>	<b>235</b>
<i>Jane Sweeney and Teresa Gutierrez</i>	
Structural Development . . . . .	235
Prenatal Movement . . . . .	238

Development of Posture, Movement, and Tone . . . . .	239
Clinical Implications for Neonatal Care. . . . .	241
Interdisciplinary Follow-Up . . . . .	243
Conclusion. . . . .	244
Theoretical Constructs in Developmental Support and Their Relation to Sensory Integration . . . . .	249
<b>The NICU Experience and Its Relationship to Sensory Integration. . . . .</b>	<b>249</b>
<i>Cheryl A. Milford and Barbara J. Zapalo</i>	
Sensory Systems Overview . . . . .	250
Evidence and Support of Sensory Integration Best-Practice Standards . . . . .	252
Sensory Integration Support in the Transition to Home. . . . .	256
Summary . . . . .	258
Acknowledgments. . . . .	258
<i>Terrie Lockridge, Ann Podruchny, and Lauren Thorngate</i>	
SIDS Definition . . . . .	262
SIDS and Infant Sleep Position: Historical Perspectives on the International Experience. . . . .	262
SIDS and Infant Sleep Position: Historical Perspectives on the American Experience . . . . .	263
Barriers to Implementation: Innovation Requires More Than Data. . . . .	264
Current AAP Recommendations . . . . .	264
Application in the NICU Setting . . . . .	273
Developmental Continuum. . . . .	274
Protocol Development: Transition to Supine Sleep Position . . . . .	274
Protocol Development: Bedding and Sleep Surfaces . . . . .	275
Protocol Development: Prone for Play . . . . .	276
Protocol Implementation Strategies. . . . .	276
Family Education . . . . .	278
Conclusion. . . . .	279
<b>Therapeutic Positioning: Neuromotor, Physiologic, and Sleep Implications. . . . .</b>	<b>285</b>
<i>Jan Hunter</i>	
Developmental Considerations in Positioning. . . . .	286
Developmental Impact of Positioning on NICU Infants . . . . .	288
Iatrogenic Positional Deformities and Developmental Consequences . . . . .	289
Therapeutic Positioning: Going Beyond Development. . . . .	289
Conclusion. . . . .	302
ADDITIONAL INSTRUCTIONAL POSITIONING PROCEDURES . . . . .	304
Supportive Infant Positioning and Handling During NICU Procedures . . . . .	304
<i>Joan Smith, MSN RN NNP-BC, and Mary Raney, MSN RN NNP-BC</i>	
<b>Oral Feeding and the High-Risk Infant . . . . .</b>	<b>313</b>
<i>Jacqueline M. McGrath, Barbara Medoff-Cooper, Whitney Hardy, and Ashley M. Darcy</i>	
Introduction . . . . .	313
The Importance of Feeding . . . . .	314

Gastrointestinal (GI) Tract: Anatomic and Physiologic Limitations . . . . .	315
Enteral Feeding . . . . .	317
Breastfeeding . . . . .	320
Nursing Interventions to Support Breastfeeding . . . . .	321
Physiology and Development of Sucking and Swallowing . . . . .	324
Sucking . . . . .	325
NNS . . . . .	328
NS . . . . .	330
Milk Volume and NS . . . . .	330
Swallowing . . . . .	331
Sucking, Swallowing, and Breathing . . . . .	332
Assessing Feeding Readiness . . . . .	332
Setting the Stage for First and Subsequent Feeding Success . . . . .	336
Psychosocial and Family Issues: Preparing for Discharge . . . . .	339
Conclusion . . . . .	342
<b>Kangaroo Care Is Developmental Care . . . . .</b>	<b>353</b>
<i>Susan M. Ludington-Hoe</i>	
Evidence to Support Integration of KC Into Routine NICU Practice . . . . .	354
Recommendations for Practice . . . . .	375
Conclusion . . . . .	377
Touch and Handling in the NICU . . . . .	393
<b>Touch and Massage for High-Risk Infants . . . . .</b>	<b>393</b>
<i>Rosemary White-Traut, Juliette Dols, and Jacqueline M. McGrath</i>	
Infant Massage . . . . .	394
Defining Infant Massage . . . . .	395
Standards of Practice . . . . .	415
Physiology of Pain . . . . .	415
<b>Pain Assessment and Nonpharmacologic Management . . . . .</b>	<b>415</b>
<i>Marlene Walden and Katherine Jorgensen</i>	
Significance of Pain Response in Neonates . . . . .	417
Definition of Pain . . . . .	417
Pain Assessment . . . . .	417
Contextual Factors Modifying Neonatal Pain Responses . . . . .	420
Nonpharmacologic Interventions for Clinical Procedures Causing Minor Pain . . . . .	421
Conclusion . . . . .	426
<b>Palliative Care . . . . .</b>	<b>431</b>
<i>Tanya Sudia-Robinson</i>	
Neonatal and Pediatric Palliative Care Background . . . . .	431
Normalization of Dying . . . . .	432

Alleviating Pain and Suffering . . . . .	433
Incorporating Developmental Care Measures . . . . .	433
Providing Parenting Opportunities . . . . .	434
Openness to Innovative Practices. . . . .	435
NICU Team Care . . . . .	436
Conclusion. . . . .	436
<b>Supporting Long-Term Development Beyond the NICU . . . . .</b>	<b>441</b>
<i>Deborah Winders Davis, Jane K. Sweeney, Carol Spruill Turnage-Carrier, and Linda Rector</i>	
Overview of Relevant Developmental Concepts . . . . .	441
Developmental Follow-Up . . . . .	443
Developmental Intervention. . . . .	443
Cognitive Skills: Attention, Self-Regulation, and Perception . . . . .	444
Early Intervention (EI) . . . . .	446
Role of the Physical Therapist . . . . .	449
Role of the OT. . . . .	455
Developmental Issues for the Technology-Dependent Infant. . . . .	456
Goals of Developmental Programs for Infants Beyond the Newborn Period . . . . .	462
Parents Shape Long-Term Outcomes. . . . .	463
Infant Characteristics . . . . .	464
Hearing and Vision Screening . . . . .	464
Developmental Intervention. . . . .	474
Developmental Teams. . . . .	474
The Plan. . . . .	475
Link to Community. . . . .	475
Conclusion. . . . .	476
<b>Beyond the NICU: Measurable Outcomes of Developmental Care . . . . .</b>	<b>483</b>
<i>Barbara A. Reyna and Rita H. Pickler</i>	
Evidence to Support Integrating Developmental Care into Routine Practice . . . . .	484
Conclusion. . . . .	490
<b>Organizational Culture, Change Implementation, and Outcomes . . . . .</b>	<b>495</b>
<i>Carol Spruill Turnage-Carrier</i>	
Influence of Culture . . . . .	495
Defining the New Culture. . . . .	498
Leadership. . . . .	504
Reflective Process for Consultation . . . . .	506
Role of Parents in the NICU. . . . .	509
Clinical Pathways to Implementing IFDC. . . . .	511
Conclusion. . . . .	513
Acknowledgment . . . . .	514

<b>Interdisciplinary Competency Validation</b> .....	<b>519</b>
<i>Jana L. Pressler, Susan M. Orlando, and Jacqueline M. McGrath</i>	
What Keeps Developmentally Supportive Care from Being Fully Implemented? .....	520
What Evidence Supports Competency in Developmental Care? .....	523
Four Key Constructs Pertinent to Understanding Developmental Care Competencies .....	525
NANN's Advanced Competency in Developmental Care .....	530
Online Developmental Care Education .....	531
Developmental Care Preceptors .....	534
Assessing, Validating, and Furthering Caregiver Developmental Care Competencies .....	535
The Use of Respect .....	535
Knowing When the NICU Has True Standards for Competency .....	536
The Requisite of Careful Planning .....	536
Incorporating Developmental Care into Physical Examinations .....	537
Partial Rationale for Competency: Preventing Complications .....	537
Features Affecting Successful Implementation .....	538
Conclusion .....	538
<b>New Roles for Developmental Care</b> .....	<b>545</b>
<i>Diane D. Ballweg and Ann E. Nepstad</i>	
Primary Roles for Effective Developmental Care Implementation .....	546
Optimal Use of Developmentally Supportive Roles in the NICU and SCN .....	557
Implementation Challenges for Developmental Care Roles .....	558
Conclusion .....	560
NANN's Advanced Competency in Developmental Care Reflects Four Standards .....	567
Professional Associations and Their Role in Developmental Care .....	567
<b>Professional Issues and the Future of Developmental Care: Where Will It Be in the 21st Century?</b> .....	<b>567</b>
<i>Carole Kenner and Jacqueline M. McGrath</i>	
Is Demonstration of Professional Competence in Developmental Care Necessary? .....	568
Strategies to Advance Developmental Care in the 21st Century .....	570
Predictions for Developmental Care in the 21st Century .....	570
Conclusion .....	571
Acknowledgments .....	571
<b>Appendix A</b> .....	<b>573</b>
<b>Appendix B</b> .....	<b>575</b>
<i>Kathleen A. VandenBerg</i>	
Developmental History, Including Behavioral Assessments and Developmental Interventions: The First Week of Life .....	575
Tim's Current Behavioral Goals and Developmental Care Plan .....	576
The Fourth Week of Life: Medical Progress .....	577

The Tenth Week of Life ..... 578  
Discharge Developmental and Behavioral Recommendations ..... 578  
Qualifications. .... 579  
Description of Duties ..... 579  
Specific Duties Include ..... 580