

Contents

Contributors	v
Preface	ix

SECTION 1

NEUROSCIENCE NURSING: CONTEMPORARY PRACTICE	1
--	---

CHAPTER 1

The State of the Science of Neuroscience Nursing Practice	1
--	---

Joanne V. Hickey

Introduction	1
The State of Health Care and Practice	1
The Information Society	2
Trends Shaping Health Care Delivery	2
National Agenda for Health	5
Professional Nursing and Neuroscience Specialty Practice	6

CHAPTER 2

Ethical Perspectives and End-of-Life Care	10
--	----

Shannon E. Pearce

Introduction	10
National Initiatives and Trends	10
An Ethical Perspective of Neuroscience Practice	11
Ethics, Morality, and Legality	12
Framework for Ethical Decision Making	13
Interdisciplinary Team	14
Decision-Making Capacity and Advance Directives and Living Wills	17
End-of-Life Care	19
National Palliative Care Guidelines	20
Referral to Palliative Care	20
Fostering Professional Growth in Ethical Decision Making ...	25

CHAPTER 3

Beyond the Hospital: Preparing and Caring for Neuroscience Patients After Acute Care	29
---	----

Andrea L. Strayer, Rachel M. Kiley, and Nancy E. Villanueva

Introduction	29
Magnitude of the Challenge: The Number of People Living With Neurological Disorders	29
Patient- or Person-Centered Care? Concepts in Evolution ...	30
Person- and Family-Centered Care Engagement and Outcomes	30
Person- and Family-Centered Care: Evidence-Based Practice	30
Agenda for Nurse-Led Care Coordination	32

Care Coordination Communication	33
Caregiving Settings Beyond Critical and Acute Care	34
Unique Discharge Challenges	37
Interprofessional Team	38
Two-Way Communication	38
Caregiving by Family and Friends	40
Care for the Caregiver	42
Research Gaps	42
Future Directions	43

SECTION 2

ASSESSMENT AND EVALUATION OF NEUROSCIENCE PATIENTS	47
---	----

CHAPTER 4

Overview of Neuroanatomy and Neurophysiology	47
---	----

Joanne V. Hickey

Introduction	47
Embryonic Development of the Nervous System	47
Cells of the Nervous System	47
Components of the Cell Body	48
Cell Processes: Axons and Dendrites	49
Physiology of Nerve Impulses	50
Functions and Divisions of the Nervous System	53
Cranial and Spinal Bones	53
Spine	55
Ligaments of the Spine	55
Intervertebral Discs	55
Meninges	56
Cerebrospinal Fluid	58
Cerebrovascular Circulation	60
Characteristics of the Cerebral Circulation	60
Blood-Brain Barrier, the BBB	64
Brain (Encephalon)	65
General Functions of the Cerebral Cortex	
According to Lobes	67
Dominance of a Cerebral Hemisphere	69
Corpus Callosum	69
Basal Ganglia	69
Diencephalon	69
Internal Capsule	70
Hypophysis (Pituitary Gland)	70
Brainstem (Midbrain, Pons, and Medulla)	71
Cerebellum	72
Special Systems Within the Brain	72
Spinal Cord	74
Dorsal (Sensory) Roots	76

Ventral (Motor) Roots	76
Classification of Nerve Fibers	76
Motor System	78
Sensory System	78
Autonomic Nervous System	81
Cranial Nerves	86

CHAPTER 5

Diagnostics for Patients With Neurological Disorders 93

<i>Nicole Bennett</i>	
Introduction.....	93
Patient and Family Teaching.....	93
X-Rays of the Head and Vertebral Column.....	94
Structural Neuroimaging Techniques of the Brain and Spinal Cord	95
Functional Neuroimaging Techniques of the Brain.....	102
Cerebrospinal Fluid and Spinal Procedures	103
Cerebrovascular Neuroimaging.....	105
Biopsies.....	107
Nervous System Electrical Activity and Conduction.....	108
Genetic Testing.....	111
Neuropsychologic Examination	111
Summary.....	112

CHAPTER 6

Comprehensive Neurological Examination..... 113

<i>Joanne V. Hickey</i>	
Purposes	113
The Neurological Examination.....	114
Conducting the Neurological Examination.....	116
Level of Consciousness.....	116
Mental Status Examination	116
Cranial Nerve Examination	121
Motor System Examination	134
Upper Extremities	135
Lower Extremities	135
Sensory System Examination.....	142
Cerebellar System Examination	146
Reflexes	146
The Neurological Examination of the Comatose Patient.....	149
Summary.....	153
Acknowledgment	154

CHAPTER 7

Neurological Assessment 154

<i>Joanne V. Hickey</i>	
Introduction.....	154
Establishing a Nursing Database	154
Overview of Neurological Assessment	155
Frequency of Assessment and Documentation.....	156
Concept of Consciousness.....	156
Identifying the Levels of Consciousness.....	159
The Glasgow Coma Scale	160
Changes in Level of Consciousness	161
Recovery and Rehabilitation.....	164
Behavior and Stream of Mental Activity	164
Cranial Nerve Assessment.....	164
Assessment of Visual Fields (Optic Nerve).....	165
Assessment of Pupils (Oculomotor Nerve).....	166

Assessment of Extraocular Movement (Oculomotor, Trochlear, and Abducens Nerves).....	171
Assessment of the Conscious, Cooperative Patient.....	171
Assessment of the Unconscious Patient	172
Assessment of Motor Function.....	172
Assessment of Muscle Strength.....	174
Involuntary Movement, Posture, and Gait	175
Sensory Assessment.....	175
Frequency and Documentation of Sensory Data.....	175
Assessment of Cerebellar Function	175
Vital Signs and Clinical Implications	176
Summary.....	181

SECTION 3

NEUROSCIENCE NURSING: COMMON MANAGEMENT CHALLENGES 183

CHAPTER 8

Intracranial Hypertension: Theory and Management of Increased Intracranial Pressure..... 183

<i>Joanne V. Hickey and JJ Baumann</i>	
Introduction.....	183
Concept of Intracranial Pressure	183
Pathophysiology.....	189
Herniation Syndromes of the Brain	190
Signs and Symptoms of Increased Intracranial Pressure....	196
Management of Patients With Intracranial Hypertension: An Interdisciplinary Collaborative Problem	200
Monitoring Intracranial Pressure.....	210
Special Syndromes: Benign Intracranial Hypertension and Hydrocephalus	214

CHAPTER 9

Hydrocephalus..... 217

<i>Nancy E. Villanueva</i>	
Pathophysiology.....	218
Etiologies.....	218
Classification of Hydrocephalus	218
Communicating Hydrocephalus.....	218
Noncommunicating Hydrocephalus	219
Assessment.....	220
Operative Procedures.....	221
Shunt Malfunction.....	222
Summary.....	227

CHAPTER 10

Management of Patients With an Altered Level of Consciousness 227

<i>Joanne V. Hickey and Bahia Elkamand</i>	
Introduction.....	227
Immobility.....	228
Specialty Beds and Support Surfaces.....	228
The Consequences of Immobility: Management of the Patient With Altered Consciousness	234
Questions	238
The Care Environment	244
Communications	244
Regaining Consciousness.....	245
Summary.....	245

CHAPTER 11**Neuroendocrine Disorders in Neuroscience Patients**..... 247*Laura J. Griffin*

Introduction.....	247
Hypothalamic–Pituitary Axis.....	247
Hypothalamic–Pituitary–Adrenal Axis.....	250
Fluid and Sodium Regulation.....	251
Dysfunction of Hypothalamic–Pituitary Axis.....	252
Sodium Disturbances.....	253
Syndrome of Inappropriate Secretion of Antidiuretic Hormone.....	255
Cerebral Salt Wasting.....	256
Hyponatremia.....	257
Diabetes Insipidus.....	257
Other Common Electrolyte Imbalances.....	259
Hypothalamic–Pituitary–Adrenal Axis Dysfunction.....	261
Summary.....	262

CHAPTER 12**Neurosurgical Procedures: Patient Care Management**..... 264*Lori Kennedy Madden, Mary Anne Ruiz, and Kia Shahlaie*

The Preoperative Phase.....	264
The Perioperative Phase.....	266
Neurosurgical Procedures and Other Related Therapeutic Techniques.....	271
Postoperative Phase.....	277
Postoperative Management and Prevention of Complications.....	282
Neurological Deficits in the Postoperative Period.....	286
Nurse's Role in Rehabilitation and Discharge Planning.....	287
Selected Neurosurgical Procedures.....	288
Future Trends.....	291
Summary.....	292

CHAPTER 13**Rehabilitation of Patients With Neurological Disorders**..... 293*Joanne V. Hickey and Lisa W. Thomas*

Introduction.....	293
Framework for Disability.....	293
Concepts of Rehabilitation.....	294
A Philosophy of Rehabilitation.....	294
Assessment of Activities of Daily Living.....	297
Principles of Rehabilitation Nursing.....	298
The Basis of Movement and Treatment of Movement Disorders.....	299
Management of the Skin.....	307
Sensory–Perceptual Deficits.....	307
Communication Deficits.....	309
Swallowing Deficits.....	309
Bladder Dysfunction and Retraining.....	312
Bowel Elimination and Dysfunction.....	317
Cognitive Rehabilitation.....	319
Home-Based Care of the Patient Who is Ventilator Dependent.....	319
Discharge Planning.....	319
Rehabilitation Legislation and Entitlement Programs.....	320
Summary.....	320

SECTION 4**NURSING MANAGEMENT OF PATIENTS WITH INJURY TO THE NEUROLOGICAL SYSTEM**..... 327**CHAPTER 14****Craniocerebral Injuries**..... 327*Norma D. McNair*

Scope of the Problem.....	327
Overview of Craniocerebral Trauma.....	327
Pathophysiology.....	328
Primary Brain Injury.....	329
Secondary Brain Injury.....	330
Primary Injury: Diagnosis and Management.....	332
Other Injuries Related to Traumatic Brain Injury.....	340
Management of the Traumatic Brain Injury Patient: The Continuum of Care.....	341
Prehospital Management.....	344
Emergency Department or Trauma Center Management..	345
Intensive Care Unit Management of Severe Traumatic Brain Injury.....	346
Management of Severe Traumatic Brain Injury During the Postacute Phase.....	356
Rehabilitation.....	356
Predicting Outcome from Traumatic Brain Injury.....	356
Prevention of Traumatic Brain Injury.....	357
Management of Traumatic Brain Injury: A Dynamic Process Through Research.....	357
Assessment and Clinical Reasoning: Key Role of the Neuroscience Nurse in Patient Care.....	358
Nursing Management of Traumatic Brain Injury.....	360
Nursing Management for Special Problems.....	361
Summary and Future Trends.....	362

CHAPTER 15**Spine and Spinal Cord Injuries**..... 365*Andrea L. Strayer*

A Perspective.....	365
Understanding the Spine and Spinal Cord Injuries.....	366
Specific Categories of Injuries.....	367
Acute Spinal Cord Trauma.....	384
Early Management of Patients With Spinal Cord Injury.....	387
Surgical Management of Spinal Cord Injury.....	391
Nonsurgical Management of Spinal Fractures and Spinal Cord Injuries.....	392
Focus on Collaborative Management in the Acute and Postacute Phases.....	394
Major Patient Management Responsibilities of the Nurse....	395
Research.....	412
Summary.....	413

CHAPTER 16**Back Pain and Spinal Disorders**..... 417*Andrea L. Strayer*

Introduction.....	417
Conditions Related to Back or Neck Pain.....	417
Low Back Pain.....	420
Neck Pain.....	422
Herniated Intervertebral Discs.....	423

Additional Common Diagnoses	436
Recurrent Symptoms After Surgery.....	447
Research and Future Trends in Practice.....	447
Summary.....	447

SECTION 5

NURSING MANAGEMENT OF CRANIAL NERVE DISORDERS AND PERIPHERAL NERVE INJURIES 449

CHAPTER 17

Cranial Nerve Diseases..... 449

Mary McKenna Guanci

Trigeminal Nerve.....	449
Trigeminal Neuralgia	449
Bell's Palsy.....	452
Ménière's Disease	454
Glossopharyngeal Neuralgia.....	455

CHAPTER 18

Peripheral Nerve Injuries..... 456

Miriana Popadich and Andrea L. Strayer

Introduction.....	456
Nerve Anatomy	457
Pathophysiology of Acute Nerve Injury	458
Pathophysiology of Chronic Nerve Injury	460
Approach to Patient Care.....	460
Diagnosis of Peripheral Nerve Injuries.....	463
Types of Peripheral Nerve Trauma	463
Planning and Implementation Treatment.....	467
Entrapment Neuropathies.....	468
Selected Chronic Peripheral Neuropathies	471
Collaborative and Nursing Management of the Patient With Peripheral Nerve Trauma and Chronic Illness-Related Neuropathies	472
Research and Future Trends in Practice.....	473
Summary.....	474

SECTION 6

Nursing Management of Patients With Neoplasms of the Neurological System 477

CHAPTER 19

Brain Tumors..... 477

Jennifer E. Cahill

Overview of Brain Tumors.....	477
Signs and Symptoms of Brain Tumor.....	487
Associated Increased Intracranial Pressure Signs	489
Approach to the Patient with a Brain Tumor.....	490
Nursing Management of the Patient with a Brain Tumor ...	501
Summary.....	510

CHAPTER 20

Spinal Cord Tumors..... 511

Julie G. Walker

Epidemiology	511
Classification.....	511
Pathophysiology.....	513

Signs and Symptoms Associated with Spinal Cord Tumors.....	515
Diagnosis.....	517
Principles of Treatment	518
Nursing Management of the Patient with a Spinal Cord Tumor	521

SECTION 7

NURSING MANAGEMENT OF PATIENTS WITH CEREBROVASCULAR DISEASE..... 527

CHAPTER 21

Transient Ischemic Attacks and Acute Ischemic Stroke.... 527

Sarah L. Livesay and Joanne V. Hickey

Disease-Specific Certification: Stroke Centers of Excellence	528
Public and Professional Education.....	528
Transient Ischemic Attacks	529
Definition and Classification of Stroke.....	529
Ischemic Stroke Subtypes	531
Anatomy, Atherogenesis, and Pathophysiology Related to Acute Ischemic Stroke	533
Signs and Symptoms of Stroke Syndromes According to the Involved Vessel	534
Medical Management and Treatment of Acute Ischemic Stroke	540
General Nursing Management of the Stroke Patient	548

CHAPTER 22

Intracerebral Hemorrhagic Stroke..... 557

Joanne V. Hickey and Sarah L. Livesay

Introduction.....	557
Overview	557
Etiology of Intracerebral Hemorrhage	557
Pathophysiology of Intracerebral Hemorrhagic Stroke.....	558
Clinical Presentation of ICH	559
Diagnostics.....	560
Nursing Management of the Hemorrhagic Stroke Patient.....	565
Coordination and Transitions in Care and Discharge Planning	567
Summary.....	569

CHAPTER 23

Intracranial Aneurysms..... 572

Tina Resser and Andrea L. Strayer

Overview	572
Locations of Aneurysms and Size	575
Clinical Grading Scales.....	578
Complications of Ruptured Aneurysm.....	587
Nursing Management of the Patient With a Cerebral Aneurysm	593
Pharmacologic Dual Antiplatelet Therapy With Stent-Assisted Embolization and Flow Diversion in Neuroendovascular Surgery.....	596
Summary.....	598
Acknowledgment	598

CHAPTER 24

Arteriovenous Malformations and Other Cerebrovascular Anomalies	601
<i>JJ Baumann</i>	
Introduction.....	601
Classifications of Vascular Malformations.....	601
Arteriovenous Malformations in the Adult: An Overview ..	605
Pediatric Arteriovenous Malformations.....	611
Arteriovenous Malformations and Pregnancy.....	618
Nursing Management of Arteriovenous Malformations	618
Acknowledgment	619

SECTION 8**NURSING MANAGEMENT OF PATIENTS WITH PAIN, SEIZURES, AND CNS INFECTIONS** 621**CHAPTER 25**

Chronic Pain	621
<i>Maureen F. Cooney</i>	
Introduction.....	621
Definition of Terms.....	622
Pain Theories.....	623
Anatomy and Physiology of Pain.....	624
Assessment and Management of Chronic Pain.....	625
Overview of Management and Treatment Options for Chronic Pain.....	630
Nursing Management of Patients With Chronic Pain.....	635
Pain Management and the Future.....	636
Summary.....	636

CHAPTER 26

Headaches	638
<i>Amy F. Larson</i>	
Introduction.....	638
Pain-Sensitive Cranial Structures and Pathophysiology	639
Classification of Headaches.....	639
Approach to Management of Headaches.....	641
Nursing Management of the Patient With Headache	648
Research Trends.....	651
Summary.....	651

CHAPTER 27

Seizures and Epilepsy	652
<i>Kathy M. England and Madona Plueger</i>	
Introduction.....	652
Entry into Health Care.....	652
Background and Definitions.....	652
Seizure Classification and Observations/Identification	658
Summary.....	664
Treatment.....	664
First-Generation AEDs	667
Second- and Third-Generation AEDs.....	669
Other Treatment Options.....	672
Management of Seizures and Status Epilepticus.....	673
Nursing Management of Patients With Epilepsy:	
Community-Based Care	675
Future Directions	679
Summary.....	679

CHAPTER 28

Infections of the Central Nervous System	681
<i>Michelle VanDemark</i>	
Introduction.....	681
Meningitis.....	681
Encephalitis	688
Other Viral Organisms that Attack the Central Nervous System	695
Research.....	700
Future.....	702
Summary.....	702

SECTION 9**NURSING MANAGEMENT OF PATIENTS WITH MOVEMENT DISORDERS, NEURODEGENERATIVE AND NEUROMUSCULAR DISEASES**..... 705**CHAPTER 29**

Parkinson's Disease	705
<i>Susan L. Heath</i>	
Introduction.....	705
Surgical Management	718
Summary.....	725
Palliative Care Resources	725

CHAPTER 30

Alzheimer's Disease and Related Dementias	729
<i>Michele Grigaitis-Reyes</i>	
Mild Cognitive Impairment	729
Pathophysiology of MCI.....	730
Dementia.....	730
Alzheimer's Disease	732
Related Dementias	735
Research.....	739
Summary.....	740

CHAPTER 31

Multiple Sclerosis	741
<i>Patricia Pagnotta</i>	
Pathogenesis and Pathophysiology	742
Signs and Symptoms.....	744
Diagnosis.....	746
Magnetic Resonance Imaging, Evoked Potentials, and Optical Coherence Tomography.....	747
Treatment.....	747
Research.....	750

CHAPTER 32

Guillain-Barré Syndrome	752
<i>Mary McKenna Guanci, Vanessa McKenna, and Jean Fahey</i>	
Introduction.....	752
Diagnosis.....	753
Collaborative Management	754
Medical Treatment	754
Nursing Management.....	754
Neurological Examination.....	755
Respiratory	755
Hemodynamics.....	755

Pain..... 755
 Anxiety..... 756
 Sleep..... 756
 Mobility..... 756
 Skin Integrity..... 756
 Nutrition..... 757
 Transitions..... 757

CHAPTER 33

Myasthenia Gravis..... 758
Wilma F. Koopman
 Introduction..... 758
 Neuromuscular Transmission and Pathophysiology..... 758
 Nursing Management..... 766
 Summary..... 767

CHAPTER 34

Amyotrophic Lateral Sclerosis..... 768
Erin L. Springer
 Introduction..... 768
 Pathophysiology..... 768
 Treatment and Management..... 771
 Collaborative Teams..... 773
 Palliative Care and End-of-Life Issues..... 774
 Nursing Management..... 774
 Research..... 775
 Future Trends in Practice..... 775
 Summary..... 775

Index..... 777