

Subject Index

Italic page numbers indicate figures; page number followed by “t” indicate tables.

A

Abbreviations, 160–161t
Ablative technologies, 42
Accreditation Council of Pediatric Neurosurgical Fellowships (ACPNF), 21
Acoustic neuroma, 24–25
Acquired diseases, RNAi therapy, 114–116
Actuation and force generation, microscale devices, 140–141, 141t
Acute care surgery
 definition, 154
 importance of elective practice, 155–156
 motivations for development, 154–155
 regionalization, 156
 uncertainties, 155
Adolescent idiopathic scoliosis, 13
Agency for Healthcare Research and Quality (AHRQ), 159, 162t
Aging, spinal disorders, 10–18, 11
All patient refined (APR) diagnosis-related group (DRG), 162t
Alzheimer’s disease
 normal pressure hydrocephalus confusion with, 108
 RNAi therapy, 112
Ambulatory Quality Alliance (AQA), 169
American Association of Neurological Surgeons (AANS), 185
 international initiatives, 188
American Board of Pediatric Neurological Surgery (ABPNS), 21
5-Aminolevulinic acid (ALA) fluorescence, diagnostic cranial imaging, 100–101, 101t
Amyotrophic lateral sclerosis (ALS), familial, 112
Androgen receptor, in meningiomas, 94
Anesthesia, intravenous sedation, 40
Angina, spinal cord stimulation, 1–2
Angioplasty, intracranial, 119–120
Annulus fibrosus (AF), 122
Anterior lumbar interbody fusion (ALIF), 84–85
Anterior portion of Meckel’s cave/quadrangular space approach, 52–53, 53
Anticatabolics, in intervertebral disc therapy, 124
Antitumor agents, new delivery methods, 43–44, 44
Artificial disc implants, for low back pain, 83
Aspirin, treatment of intracranial stenosis, 119
Astrocytomas, 2, 2
Atherosclerotic Lesions in the Vertebral or Intracranial Arteries (SSYLVA) study, 120
Aviation safety, neurosurgery comparison, 195

B

Bacterial artificial chromosomes (BACs), 8
The Basophil Adenomas of the Pituitary Body and Their Clinical Manifestations (Cushing), 31
Behavioral neurosurgery
 history, 23
 modern, 23–24
Biocompatibility, surgical microdevices, 145

Bioengineering, 134–136
Body mass index (BMI)
 male meningioma patients, 237
 MIB-1 labeling index and, 238, 238
Bone mineral density (BMD), referenced database and scoring, 11
Bone morphogenetic proteins (BMPs), 17, 124–125
Brain-computer interface (BCI), 134–136, 135
Brain-machine interface, 134–136
Brain tissue oxygenation, 61
Brain tumors
 allelic imbalance in, 7
 cancer stem cell paradigm, 7–8
 improved molecular understanding, 43
 malignant, 4–9
 RNAi therapy, 114–115, 115t
 types, 37
Brigham and Women’s Hospital (BWH)
 Meningioma Project, 91, 97–98
 neurosurgical oncology, 37

C

Cartilage-derived morphogenetic protein (CDMP)-1, 125
Cavernous sinus approach, 53
Center for Medicare and Medicaid Services (CMS), 157, 163–164, 163t
 P4P demonstration projects and status, 170
 QI Roadmap, 163
Central nervous system
 gamma knife radiosurgery for metastases, 241–247
 RNAi delivery, 111–112
Cerebral aneurysm stenting
 history, 64–67, 65–67
 non-FDA-approved devices, 67–68, 68
Cerebral oximetry, 58–63
Cerebrospinal fluid
 circulation, 129
 dynamics of, 132
 history of, 129
 neuroendocrine distribution pathway, 131–132
Children’s Cancer Group (CCG), 7
Choroid plexus cauterization (CPC), endoscopic third ventriculostomy and, 78–82, 79–80, 80t
Chronic low back pain, lumbar disc arthroplasty, 83–87
Chronic pain, motor cortex stimulation, 70–77
Circulation research, emerging field of, 129–133
Computed tomographic myelography, adult scoliosis, 13
Computed tomography (CT)
 diagnostic cranial imaging, 100–101, 101t
 intraoperative cranial imaging, 101
Congress of Neurological Surgeons (CNS), 185
 international initiatives, 188
Continuous quality improvement (CQI), 157
Convexity meningiomas, 97
Coronal plane, approaches for cranial base surgery, 51–54, 52

Coronary artery bypass graft (CABG), comparison to spinal cord stimulation, 1
 Cranial base meningiomas, 97
 Cranial imaging, 100–104
 diagnostic, 100–101, 101t
 intraoperative, 101–103
 Crew Resource Management (CRM), 195–198, 196
 Cushing, Harvey, 36, 91, 129
 Cushing's syndrome, 31

D

Data knife, 143, 143
 Deep brain stimulation (DBS)
 clinical practice, 107, 108
 refractory pain syndromes, 70
 for treatment-resistant depression, 88–90
 Depression
 stereotactic neurosurgery and, 24
 vagal nerve stimulation *versus* deep brain stimulation, 88–90
 Developing countries, neurosurgery in, 185–186
 Diagnosis-related groups (DRGs), 160–163
 Diffusion tensor imaging (DTI)
 intraoperative cranial imaging, 103
 for surgical planning, 38, 39
 Drug delivery systems (DDS)
 antitumor agents, 43–44, 44
 nanoparticles, 145
 relief of pain, 2
 Dual-energy x-ray absorptiometry (DEXA), diagnosis of osteoporosis, 10
 DYT1 dystonia, RNAi therapy, 114

E

Elderly patients, meningiomas, 96–97
 Electrical cortical mapping (ECM), 74
 Electrocorticography (ECoG), 134–135, 135
 Electroencephalography (EEG), 134
 Electromagnetic fields, meningiomas and, 95
 Emergency and trauma services
 emerging crisis in, 200–205
 fact and fiction: neurosurgical perspective, 153–156
 future of emergency care in the U. S., 192–193
 Germany: European perspective, 206–208
 neurosurgical, 149–152
 patient access to emergency surgical care, 202–203, 202–205, 203t
 Emergency Medical Treatment and Active Labor Act (EMTALA), 149
 Endoscopic cranial base surgery, 48–57
 established feasibility, 54
 generalizability, 55
 historical foundation and technology, 48–49
 modularity of approaches and anatomic relationships, 49
 safety and efficacy, 54–55, 55
 Endoscopic endonasal transsphenoidal approach, suprasellar cistern, 226–235, 227–233

Endoscopic third ventriculostomy (ETV)
 choroid plexus and, 78–82
 as primary treatment, 78, 79
 Endoscopic transnasal surgery, clinical practice, 107–108, 108
 Endostatin, continuous release, 43
 European Organization of Research and Treatment of Cancer (EORTC), 4
Explorations in Healthcare Quality and Monitoring (Donabedian), 157
 Extracellular matrix (ECM), 122

F

Fluid mechanics, microscale devices, 140, 140
 Foundation for International Education in Neurosurgery (FIENS), 185, 188
 Fractures, osteoporotic, 10–13
Future of Emergency Care in the US Health System (IOM), 192

G

Gamma knife radiosurgery
 control after, 243–244, 244, 244t
 malignant melanoma brain metastases, 241–247, 242t
 Genes, importance in meningiomas, 92–93
 Glioblastoma multiforme (GBM), 4–9
 Gliomas
 molecular understanding of, 43
 pathway to progression, 5
 progression in, 4–5
 standard of care, 6
 Globalization
 future of neurosurgery, 185–189, 186t
 implications, 188–189, 190t
 meningiomas, 92
 Glycosaminoglycan (GAG), 122
 Government Accountability Office (GAO), 164
 Growth and differentiation factor (GDF)-5, 125
 Growth factors, in disc regeneration, 124–125

H

Hamilton Rating Scale for Depression (HRSD), 88
 Health Care Finance Administration (HCFA), patient safety initiative, 189
 Healthcare quality assurance movement, 157
 abbreviations used, 159–160t
 data sources and measurement instruments, 158–161
 Health Insurance Portability and Accountability Act (HIPAA), patient safety initiative, 189
 hNT2.17 cell line, intrathecal transplantation in spinal cord injury model, 220–225, 222–224, 223t
 Hormones, role in meningiomas, 94
 Hospitals
 discharge rates for neurosurgical patients, 209
 percentage of inpatient hospital charges for neurosurgery, 211t
 surgical innovations, 108–109
 total charges for neurosurgical patients, 210

Human immunodeficiency virus-induced encephalopathy, RNAi therapy, 115
 Huntington's disease (HD), RNAi therapy, 113
 Hydrocephalus
 classification of, 129
 congenital, 81, 81t
 ETV as primary treatment, 78
 ETV/CPC treatment, 78–81
 neuroendoscopy and, 20
 normal pressure, 108, 129–131
 diagnosis and treatment of, 130
 shunt placement 131
 postinfectious and posthemorrhagic, 81–82
 Hypertonic saline (HTS), treatment for acute spinal cord injuries, 213–219

I

Institute of Medicine (IOM)
 division of NAS, 161–163, 163t, 178
 Future of Emergency Care in the US Health System, 192
 Quality Initiative, 157
 International medical organizations, 186t
 Interstitial laser therapy, 42
 Intervertebral disc (IVD)
 degeneration, 83, 123
 structure and biochemistry, 122–123, 123t
 therapy, 123–124
 whole disc transplantation, 126
 Intracerebral microinfusion, 43
 Intracranial stenosis, treatment, 119–120
 Intracranial vascular disease, ischemic stroke secondary to, 118–121
 Intraoperative imaging and instrumentation, 21, 41–42
 low-grade gliomas, 42
 Intrathecal drugs, relief of pain, 2–3, 3t
 Intravenous sedation anesthesia, 40
 Ischemic stroke, secondary to intracranial vascular disease, 118–121

J

Joint Commission on the Accreditation of Health Care Organizations (JCAHO), 189
 Jugular bulb oximetry, 60

K

Kyphoplasty, 12

L

Liability, neurosurgical emergency and trauma services, 151
Liability is Rooted in Elective Spine Cases: 4 Years of TDC Data Analyzed (Wohns), 151
Life of Sir William Osler (Cushing), 31
 LIM mineralization protein-1, 125
 Line observation safety audits (LOSA), 196–198, 198
 Link N, 125

Low-grade gliomas (LGGs), 4–5, 5
 intraoperative imaging, 42
 Lumbar disc arthroplasty, 83–87

M

Magnetencephalography (MEG)
 diagnostic cranial imaging, 100–101, 101t
 intraoperative cranial imaging, 103
 Magnetic resonance imaging (MRI)
 adult scoliosis, 13
 diagnostic cranial imaging, 100–101, 101t
 disc degeneration, 123
 gangliocytoma, 37
 intraoperative, 19–20, 20–21
 intraoperative cranial imaging, 101–104, 102, 102t, 103
 low-grade gliomas, 4
 for MCS, 72
 for surgical planning, 38, 39–40
 Magnetic stereotaxy, clinical practice, 107, 107
 Malignant melanoma, brain metastases, gamma knife radiosurgery for, 241–247, 242t
 Material properties, microscale devices, 139–140, 140
 Mathematics of failure, presidential address, 28–35
 Meckel's cave, quadrangular space approach, 52–53, 53
 Medial petrous apex approach, 51–52
 Medical education and certification, 180–181
 Medicare Payment Advisory Committee (MedPAC), 164–166, 166t
 Medicare prescription drug improvement and Modernization Act of 2003, 157
 Medulloblastoma, 6–7
 Meningioma Project and Meningioma Center at BWH, 91, 97–98
 Meningiomas, 91–99
 causes and epidemiology, 92–93, 92–95
 in elderly patients, 96–97
 globalism, 92
 history, 91–92
 obesity in male patients, 236–240, 237t, 238
 observation, 95
 patient advocacy, 92
 quality of life, 97
 recurrence, 97
 specific locations, 97
 surgery, 95–96
 treatment options, 95–96
Meningiomas, Their Regional Behavior, Life History, and Surgical End Results (Cushing & Eisenhardt), 91
 Methyl guanine methyl transferase (MGMT), 6
 MIB-1 labeling index, BMI effects in male patients, 238, 238
 Micro-Electro-Mechanical Systems (MEMS), 137
 examples in microsurgery, 141–143
 microdevices in daily use, 138, 139
 Microfabrication, 137–139, 138–139
 advantages, 138
 software tools, 137–138
 Microimaging techniques, 8, 8
 Micro RNAs (miRNAs), 110

Microsurgery
 acoustic neuroma, 24–25
 MEMS examples in, 141–143
 surgical microdevices, 137–147
 Microtechnology, 137–147
 Midline meningiomas, 97
 Motor cortex stimulation (MCS)
 externalized trial, 73–75
 mechanism of action and patient selection, 71–73
 refractory benign pain, 70–77
 relief of neuropathic pain, 2
 surgical technique and options, 74–75
 Motor neuron diseases, RNAi therapy, 112, 112–113
 Movement disorders, RNAi therapy, 114

N

Nanoscale manipulation, 145–146
 Nanotechnology and nanomedicine, 145–146
 National Quality Forum (NQF), 168–169, 168t
 National Surgical QI Program (NSQIP), 169–170
 Neural interfaces, 143–144, 144
 Neurodegenerative diseases, RNAi therapy, 112–114
 Neuroendoscopy, 20
 Neurointensive care unit (NICU), 59–60
 Neuronal cell line, intrathecal transplantation in spinal cord injury
 model, 220–225
 Neuropathic pain, motor cortex stimulation, 2
 Neurosurgery
 changing models of leadership, 191
 competencies and safety, 180–184
 emergency and trauma services, 149–152, 192–194
 error reduction through team leadership, 195–199
 essential knowledge, 26–27
 future, 185–191
 Political Action Committee (PAC), 173–174
 translating research to clinical practice, 106–109
 U. S. position and strategy, 173–175
 use and costs, 209–210, 209–211, 210–211t
 Washington office and Washington committee structure and
 approach, 174–175
 Neurosurgical neuroscience, 190–191
 Neurosurgical oncology, 36–46, 37–38
 at the BWH, 37–40
 intraoperative imaging, 41–42
 intravenous sedation anesthesia, 40
 molecular understanding of brain tumors, 43
 navigation in the traditional operating room, 40–41
 neurosurgeon as local oncologist, 44
 new imaging techniques and preoperative brain mapping, 38–
 40, 39–40
 novel techniques, 38
 as a specialty, 36–37
 Neurosurgical procedures
 estimated use rates, 210t
 percentage of inpatient hospital charges, 211t
 NIRS, 60–61
 Nonviral *versus* viral vectors, RNAi delivery, 111

NP cell transplantation, 125–126
 Nucleus pulposus (NP), 122

O

Obesity, male meningioma patients, 236–240, 237t, 238
 Oligodendrogliomas, 6
 Oncogenomics, 7, 8
 Osteogenic protein-1, 125
 Osteoporosis, 10–13, 11, 11t
 medical treatment options, 12t
 risk factors, 11t
 secondary causes, 11t

P

Pain. *see also* Chronic pain; Neuropathic pain; Pain
 intrathecal drugs for, 2–3, 3t
 neurosurgery developments, 1–3
 RNAi therapy, 115
 Parathormone-related peptide, in meningiomas, 94
 Parkinson's disease (PD), RNAi therapy, 114
 Patient safety, 178
 initiative, 189–190
 Pay-for-Performance (P4P), 157, 158
 current CMS demonstration projects and status, 170
 demonstration initiatives, 169–170
 hospital demonstration initiatives, 170–171
 other projects under development, 170
 problems, 171–172
 Pediatric neurosurgery, 19–22
 collaborative projects, 21
 subspecialty education and certification, 21–22
 Peer review organizations (PRO), 167
 Petroclival approaches, 52, 53
 Physician Consortium for Performance Improvement, AMA, 167–
 168
 Physician-Hospital Collaboration Demonstration (PHCD), 169
 Physician quality measures, 167, 167–170
 Physician voice, representation, and leadership, 172–173
 Physician Voluntary Reporting Program (PVRP), 169–170
 Pilocytic astrocytoma, 21
 Platelet-derived growth factor (PDGF), in meningiomas, 94
 Polyglutamine repeat diseases, RNAi therapy, 113–114
 Positron emission tomography (PET)
 diagnostic cranial imaging, 100–101, 101t
 for MCS, 72
 Postchiasmal lesions
 closure, 231–233, 233
 endoscopic endonasal approach, 231, 231–232
 Prechiasmal lesions
 closure, 232, 232–233
 endoscopic endonasal approach, 231–232, 232
 Preoperative brain mapping, 38–40, 39–40
 Preoperative planning, motor cortex stimulation, 74, 74
 Presidential Address, 28–35
 Prion diseases, RNAi therapy, 115–116
 Progesterone receptors, in meningiomas, 94

Prolactin receptor, in meningiomas, 94

Q

Quality improvement organizations (QIO), 166–167
Quality in healthcare, 157–177

R

Radiation, role in meningioma formation, 93–94
Radiosurgery
 functional, 25
 gamma knife
 control after, 243–244, 244, 244t
 malignant melanoma brain metastases, 241–247, 242t
 vestibular schwannoma, 24–25
Ribonucleic acid interference (RNAi), 110–117
 clinical applications, 112–116
 delivery systems, 111–112
 expression cassettes, 111
RNA-induced silencing complex (RISC), 110

S

Sagittal plane, approaches for cranial base surgery, 49–51
Scaffolds, 126–127
Scoliosis, 13–15, 14, 15t
Self-Assessment in Neurological Surgery (SANS) Program, 182–184, 183
Sensing, microscale devices, 141, 141
shRNAs, 110–111, 111
Single nucleotide polymorphism (SNP) array, 8
siRNAs, 110–111, 111
Slow-release microspheres, 43
Somatosensory evoked potentials (SSEP), 73–74
SOPs, 196–197
Sox-9, 125
Spectral karyotyping (SKY), 8
Spinal cerebellar ataxia, RNAi therapy, 113–114, 114
Spinal cord injury
 hypertonic saline as treatment, 213–219
 intrathecal transplantation of human neuronal cell line, 220–225
Spinal cord stimulation, for angina, 1–2
Spinal fusion, *versus* lumbar disc arthroplasty, 84–86
Spinal muscular atrophy (SMA), RNAi therapy, 112–113
Spine disorders
 aging and, 10–18, 11
 emerging treatments in the elderly, 17
Spondylolisthesis, 15–17
Stem cells
 malignant brain tumors, 7–8
 therapeutic delivery vehicle, 44
 therapy, 126
Stenting
 cerebral aneurysm, 64–68
 intracranial stenosis, 119–120
Stereotactic neurosurgery, 23–27

 acoustic neuroma, 24–25
 depression, 24
Stroke, 118–121
 treatment, 118–119, 119t
Surgeons, median total compensation, 203t
Surgical microdevices, 137–147
 automation and control, 144, 144–145
 biocompatibility, 145
 scaling of material properties, 139–141, 140
 sensing and feedback, 143, 143–144
Surgical mortality
 gamma knife radiosurgery, 242, 242–243, 243t
 head, chest, and abdominal wounds, combat in US Army, 201t
 percentage who die from wounds, combat in US Army, 201t
 TBI, 207–208, 208t
Surgical Parallax, 28
Surgical Quality Alliance, 169, 169t
Surgical research
 introducing innovation into the hospital, 108–109
 translating to clinical practice, 106–109

T

Technology
 introducing innovation into the hospital, 108–109
 translating research to clinical practice, 106–109
Thoracolumbar kyphoscoliosis, 15, 15, 16
Tissue cutting, MEMS-based instrumentation, 142, 143
Tissue handling and microgripping, MEMS-based instrumentation, 141–142, 142
Total quality management (TQM), 157
Traffic-related injuries, Germany, 206
Transclival approach, 50–51, 51
Transcranial magnetic stimulation, repetitive (rTMS), 72
Transcribiform approach, 50, 50
Transforming growth factor- β (TGF β), 124
Transmissible spongiform encephalopathies (TSEs), RNAi therapy, 115–116
Transodontoid approach, 51, 52
Transplantation
 intrathecal, neuronal cell line in spinal cord injury, 220–225
 whole disc, 126
Transplanum, transtuberulum approach, suprasellar cistern, 226
Transplanum approach, 49, 50
Transpterygoid/infratemporal approach, 53–54
Transsellar approach, 49, 49
Transsphenoidal approach, suprasellar cistern, 226–235, 227–233
Trauma, role in meningioma formation, 94, 94
Trauma care. *see* Emergency and trauma services
Traumatic brain injury (TBI), 58–63
 Germany, 206, 207t
 injury mechanisms in, 58–59
 from injury site to hospital, 206–207
 outcome/mortality rate, 207–208, 208t
Tumors of the Nervus Acusticus (Cushing), 31

U

Ultrasonography
 focused, 42
 intraoperative, 21

V

Vagal nerve stimulation (VNS), for treatment-resistant depression, 88–90
 Vascular endothelial growth factor (VEGF), in meningiomas, 94
 Vertebral fractures, 12

W

Warfarin, treatment of intracranial stenosis, 119
 Warfarin-Aspirin Symptomatic Intracranial Disease (WASID) trial, 119
 Whole-brain radiation therapy (WBRT), 241–247
 World Congress of Neurosurgery, WFNS, 187

World Federation of Neurosurgical Societies (WFNS), 185, 186–187, 187t
 Committees, 188, 189t
 education courses, 187
 Foundation, 188
 instrument sets and microscopes, 188
 Reviews in Neurosurgery, 188
 training programs, 188
 website, 188
 WHO relationship, 188
 World Congress of Neurosurgery, 187
 World Directory of Neurosurgeons, 188
The World is Flat (Freidman), 185

Y

Yttrium-aluminum-garnet (YAG) laser, pediatric neurosurgical disease, 21