Recognizing the fundamental congruence between behavioral neurology and neuropsychiatry, the Joint Committee on Subspecialty Certification of the American Neuropsychiatric Association (ANPA) and the Society for Behavioral and Cognitive Neurology (SBCN) assert that these historically separate but parallel disciplines can be merged into a single subspecialty area of medicine: Behavioral Neurology & Neuropsychiatry. The authors first describe the historical background for the development of this medical subspecialty. Second, the goals and objectives for training in Behavioral Neurology & Neuropsychiatry are outlined. Finally, a core curriculum for fellowship training in Behavioral Neurology & Neuropsychiatry developed by SBCN and the ANPA is presented.

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view and examination and extend the core knowledge base and clinical skills that define modern neuropsychiatry and behavioral neurology.

Behavioral neurology and neuropsychiatry share the core philosophical position that brain and behavior are inseparable.\textsuperscript{3,4,8,9} Reciprocal interactions between psychological factors and neuropsychiatric illness are appreciated, yet both are fundamentally understood in terms of brain function and dysfunction.\textsuperscript{3,4,8–11} Clinically, behavioral neurologists and neuropsychiatrists elicit and construct comprehensive patient histories that emphasize neurodevelopmental and environmental influences on cognitive, emotional, behavioral, and elementary neurological function. Assessment of these functions requires of practitioners both an extensive knowledge of brain-behavior relationships and also the skills to apply that knowledge to clinical practice. The assessment is also guided and made more systematic by the use and interpretation of standardized, validated, and reliable metrics of cognitive, emotional, behavioral, and elementary neurological functions developed specifically for use in behavioral neurology and neuropsychiatry. The use and interpretation of neuroimaging, electrophysiologic, and other laboratory measures that inform diagnosis and/or treatment planning is emphasized as an essential element of neurobehavioral and neuropsychiatric assessment. Interpreting clinical signs, symptoms, and syndromes as reflecting neural processes supercedes conventional (i.e., DSM-based) psychiatric diagnoses, and the historical dichotomization of clinical conditions into strict “psychiatric” or “neurological” types is rejected in favor of a more integrative approach. A principal goal of this integrative approach is to transcend the mind-brain duality reflected in the separation of psychiatry and neurology. Consequently, the clinical and scientific purview of behavioral neurology and neuropsychiatry is broad and includes, at a minimum, the following:

1. Focal neurobehavioral syndromes (e.g., aphasias, apraxias, agnosias, aprosodias, apraxia, executive dysfunction, orbitofrontal syndrome);
2. Major neuropsychiatric syndromes (e.g., delirium, the dementias, and the major primary psychiatric disorders, including those with atypical or refractory presentations);
3. Neurological conditions with cognitive, emotional, behavioral features (e.g., dementias, movement disorders, stroke, epilepsy, multiple sclerosis, traumatic brain injury [TBI]); and
4. Comorbid neuropsychiatric and neurological conditions (e.g., Down’s syndrome and Alzheimer’s disease, obsessive-compulsive disorder and Tourette’s syndrome, Huntington’s disease and alcohol abuse).

Given the breadth of the clinical problems encountered by behavioral neurologists and neuropsychiatrists, expertise in pharmacological, behavioral, psychosocial, and environmental interventions is required to address comprehensively the needs of patients with these conditions and their families. This comprehensive approach to clinical assessment and treatment both blends and adds to the historically distinct neurological and psychiatric examinations. This approach to assessment and treatment distinguishes the clinical paradigm employed in behavioral neurology and neuropsychiatry as unique among other medical subspecialties in the clinical neurosciences.

Recognizing the fundamental congruence between behavioral neurology and neuropsychiatry, the Joint Committee on Subspecialty Certification of the American Neuropsychiatric Association (ANPA) and the Society for Behavioral and Cognitive Neurology (SBCN) assert that the body of knowledge pertaining to the phenomenology, pathophysiology, diagnosis, and treatment of cognitive, emotional, and behavioral disturbances among persons with neurological conditions is common to both behavioral neurology and neuropsychiatry. These historically separate but parallel subdisciplines can therefore be merged into a single subspecialty area of medicine that herein will be referred to as Behavioral Neurology & Neuropsychiatry.

Behavioral Neurology & Neuropsychiatry is defined as a medical subspecialty committed to better understanding links between neuroscience and behavior, and to the care of individuals with neurologically based behavioral disturbances.\textsuperscript{12} Expertise and clinical competence in Behavioral Neurology & Neuropsychiatry requires a combination of knowledge and skills that are beyond the scope of those required for the practice of general neurology or general psychiatry, either alone or in combination. While the knowledge base and clinical skills of behavioral neurologists and neuropsychiatrists are built upon on the foundation established by primary training in one or both of these specialties, expertise and clinical competence in Behavioral Neurology & Neuropsychiatry requires experience specific to the evaluation, differential diagnosis, prognosis, pharmacological treat-
ment, psychosocial management, and neurorehabilitation of persons with complex neuropsychiatric and neurobehavioral conditions. 3,4,7–9,13–18 The body of knowledge and clinical skills circumscribed by Behavioral Neurology & Neuropsychiatry is additive to those of general psychiatry and general neurology and are distinct from other subspecialties of these medical specialties. Accordingly, training and experience in Behavioral Neurology & Neuropsychiatry are needed to achieve competence to practice in this area of medicine.

Until recently, training programs in behavioral neurology and neuropsychiatry throughout the U.S. produced practitioners in one or the other of these previously separate subspecialties. Although the goals and objectives for training used by these programs programs overlapped substantially, the core curriculum used in those programs varied considerably. In the service of standardizing fellowship training in these areas, the ANPA promulgated Standards for Fellowship Training in 2001. 19 Recognizing the need to specify further the educational content that programs are expected to provide to fellows undertaking subspecialty training in this area, the SBCN and the ANPA partnered to develop a core curriculum for training in the unified medical subspecialty of Behavioral Neurology & Neuropsychiatry. The Joint Committee for Subspecialty Certification of the ANPA and the SBCN drew upon work in this area undertaken previously by the Behavioral Neurology Section of the American Academy of Neurology and the Curriculum Task Force of ANPA to identify potential curricular content for training in Behavioral Neurology & Neuropsychiatry. This group also undertook a review of the Accreditation Council on Graduate Medical Education (ACGME) program requirements for training in psychiatry 20 and neurology; 21 review and comparison of potential curricular content for Behavioral Neurology & Neuropsychiatry with that of other established neurological and psychiatric subspecialties, including addiction psychiatry, clinical neurophysiology, forensic psychiatry, geriatric psychiatry, and neurodevelopmental disabilities as specified by the American Board of Psychiatry and Neurology (ABPN); 22 as well as review of and comparison with the program requirements for residency education in psychosomatic medicine; 23 integration of the proposed core curriculum with the standards for fellowship training in neuropsychiatry as specified by the ANPA; 19 and review of content in current textbooks as a guide to essential elements of the core curriculum for training Behavioral Neurology & Neuropsychiatry. 3,4,7–9,13–18,24–32 fellows.

It is not the objective of this document to specify the manner in which the educational goals and objectives for subspecialty training are met in an individual training program or the methods by which competence in Behavioral Neurology & Neuropsychiatry is achieved or evaluated. This document serves instead to outline broadly the core curricular content for training programs in Behavioral Neurology & Neuropsychiatry. Although training programs may differ in their methods, it is expected that fellows will master the core curricular content described herein regardless of differences in their clinical experiences. Accordingly, the methods by which knowledge and performance skills are taught during the course of training are considered separately from the core curricular content. For more information regarding possible methods of educational programming, readers should consult the United Council for Neurological Subspecialties (UCNS) website (http://www.ucns.org/accreditation/application/) and the document there entitled “Training Program Requirements.”

Finally, the core curriculum for training in Behavioral Neurology & Neuropsychiatry described in this article should be regarded as an initial formulation of the core knowledge and skill set expected of practitioners in this subspecialty. As new knowledge and skills are incorporated into this area of clinical practice and education, the core curriculum for training in this area will undoubtedly require revision. Additionally, the process of continued review and implementation of this core curriculum by the UCNS may entail changes in its formatting and content. Readers are encouraged to consult the UCNS website to view the final form of this core curriculum when preparing for the certification examination and/or designing training programs in Behavioral Neurology & Neuropsychiatry.

Goals and Objectives for Training in Behavioral Neurology & Neuropsychiatry

1. Developing clinical expertise in the care of patients with brain dysfunction including understanding of diagnostic skills, neurological and mental status examinations, cognitive testing, electrophysiological testing, neuroimaging, differential diagnosis, crisis intervention, application of time-limited psychotherapy, and referral for rehabilitative therapies.
2. Gaining broad knowledge in the field through extensive exposure to the core literature in neuropsychiatry, neuropsychology, and behavioral neurology. Neuroanatomy and neurochemistry of cognition, emotion, and behavior must be emphasized.

3. Understanding the principles and practice of neuropsychopharmacology, with special emphasis on psychostimulants and other catecholaminergically active agents, cholinesterase inhibitors, NMDA receptor antagonists, anticonvulsants, atypical antipsychotics, antidepressants, and emerging neuropharmacological agents, as well as the interactions of such agents with other medications on central nervous system (CNS) function.

4. Participating in a structured educational curriculum that complements clinical and self-study experiences, usually consisting of rounds, case conferences, individual supervision, didactic lectures, and other courses or seminars relevant to training in Behavioral Neurology & Neuropsychiatry.

5. Developing an understanding of research methodology in Behavioral Neurology & Neuropsychiatry.

Curriculum for Training in Behavioral Neurology & Neuropsychiatry

The core curriculum for Behavioral Neurology & Neuropsychiatry is composed of four primary content areas: 1) structural and functional neuroanatomy, 2) neurobehavioral and neuropsychiatric assessment, 3) treatment, and 4) neurobehavioral and neuropsychiatric syndromes.

These content areas collectively reflect the breadth and diversity of the field. Clinical training in Behavioral Neurology & Neuropsychiatry must emphasize the principles of clinical assessment and treatment. Accordingly, training programs should emphasize mastery of the first three core curricular content areas described herein regardless of the specific clinical focus (e.g., dementias, stroke, TBI) of those programs. Fellows in Behavioral Neurology & Neuropsychiatry are expected to both complement and supplement their “bedside-learning” with guided self-directed learning activities (i.e., reading relevant textbooks and peer-reviewed articles) and didactic experiences (i.e., seminars, case conferences, grand rounds, local or national conferences) related to the fourth core curricular content area (neurobehavioral and neuropsychiatric syndromes).

Structural and Functional Neuroanatomy

The Behavioral Neurology & Neuropsychiatry fellow will develop expertise in:

1. The structural and functional organization of the cerebral cortex and its major divisions; white matter tracts; limbic and paralimbic structures; anatomic and functional basal ganglia; diencephalon; the mesencephalon, metencephalon, and myelencephalon; and the cerebrovascular and ventricular systems.

2. The structural and functional organization of cortico-cortical and cortical-subcortical circuits.

3. Structural and functional cerebral hemispheric specialization, particularly as regards localization and lateralization of cognitive, emotional, behavioral, and sensorimotor functions.

4. Neuroanatomy, metabolism, and functional significance of the major neurotransmitter systems, local circuit and modulatory neurotransmitters, neuropeptides, neurohormones, and other endogenous neuroactive substances in the CNS.

The fellow in Behavioral Neurology & Neuropsychiatry will develop expertise in the structural and functional bases of cognition, emotion, and behavior, including:

1. Cognition (e.g., arousal, perception, attention, language, memory, praxis recognition, visuospatial function, executive function).

2. Emotion (e.g., mood, affect, prosody [affective communication]).

3. Behavior (e.g., motivation, comportment, personality).

Neuropsychiatric Assessment

The Behavioral Neurology & Neuropsychiatry fellow will be provided with education and experience in the areas of clinical assessment listed below. Note that neuropsychological assessment is an exception to this requirement, and instead is most appropriately regarded as an area in which acquisition of advanced knowledge, and not necessarily performance skills, is an appropriate goal of fellowship training.

Neurological Examination

1. Elemental neurological function (e.g., cranial nerves; motor; sensory; coordination; gait; reflexes, including primitive reflexes [frontal release signs]).

2. Neurological soft-signs.

3. The use of neurological examination rating scales and the interpretation of such data.

Mental Status Examination

1. General assessment (e.g., appearance and behavior, speech, thought process, thought content, emotion, comportment, personality).
2. Cognitive examination (e.g., arousal, attention, language, memory, praxis, recognition, visuospatial function, executive function).
3. Adjusting mental status examination content and process in a manner sensitive to the patient's abilities or impairments in order to facilitate useful description of findings in patients who are unable to cooperate with any or all parts of a formal cognitive examination.
4. Interpreting mental status examination findings with respect to their structural and functional neuroanatomical correlates.
5. Developing a differential diagnosis based on mental status examination findings and their integration with findings from the neurological examination.
6. Indications for, administration of, and interpretation of standardized neuropsychiatric rating scales that supplement the neuropsychiatric history and mental status examination.

Neuropsychological Assessment
1. The content, sensitivity, and specificity of neuropsychological assessment methods (e.g., fixed assessment batteries, flexible batteries, projective testing, personality assessment tools).
2. The influence of age, education, cultural background, fatigue, drugs, sensory impairment, and primary psychiatric illnesses on test performance.
3. The role of and indications for neuropsychological testing in evaluation and treatment planning related to neurobehavioral and neuropsychiatric disorders.
4. The relationship between neuropsychological test results and bedside or office-based screening mental status examinations.
5. The anatomical and disease correlates of neuropsychological test abnormalities.

Neuroimaging
1. Principles and applications of structural and functional imaging of the brain, including the generally accepted clinical indications for such studies.
2. Correlation between neuroimaging findings and clinical examination (neurological and/or mental status) findings in persons with neurobehavioral or neuropsychiatric syndromes.

Electrophysiologic Testing
1. Principles and applications of electrophysiologic recordings of the CNS
2. Correlation between electrophysiologic findings and clinical examination (neurological and/or mental status) findings in persons with neurobehavioral or neuropsychiatric syndromes.

Laboratory Studies
1. Indications for serum and urine studies relevant to the evaluation of patients with neuropsychiatric and neurobehavioral conditions.
2. Indications for and interpretation of results from CSF examination relevant to the evaluation of patients with neuropsychiatric and neurobehavioral conditions.

Integration and Presentation of Findings
1. Integration of collateral historical information into the clinical assessment;
2. Development of a neurobehavioral and neuropsychiatric differential diagnosis;
3. Formulation of a neurobehavioral or neuropsychiatric diagnosis based on findings from the clinical assessment;
4. Development of a treatment plan for the neurobehavioral or neuropsychiatric condition; and
5. Presentation, both verbally and in writing, of clinical impressions and recommendations derived from the comprehensive clinical assessment to the patient and his or her family, other healthcare professionals, officers of the court, and other private or public agencies providing services to the patient.

Treatments
The Behavioral Neurology & Neuropsychiatry fellow will demonstrate knowledge about and clinical competency in the prescription and/or monitoring of somatic therapies, psychosocial interventions, crisis intervention, and basic neurorehabilitation, as specified below:

Somatic Therapies
1. Therapeutic uses, benefits, side effects, and risks associated with psychotropic and neuropharmacologic agents commonly used in the care of patients with neurobehavioral and neuropsychiatric disorders.
2. Drug-drug interactions related to these and other medications commonly used in the care of patients with neurobehavioral and neuropsychiatric disorders.
3. Knowledge of the indications and contraindications for the use of ECT, neurosurgical procedures (i.e., ablative procedures, deep brain stimulators, vagus nerve stimulators, etc.), and other somatic therapies (e.g., transcranial magnetic stimulation) in the treatment of patients with neurobehavioral and neuropsychiatric disorders.
Psychosocial Interventions

1. Knowledge of and indications for psychosocial interventions used in the care of patients with neurobehavioral and neuropsychiatric disorders, including supportive therapy, family therapy, other psychotherapeutic interventions relevant to the care of persons with neuropsychiatric and neurobehavioral disorders, including patient and family education, environmental interventions, behavioral management strategies, and use of and referral to community resources.

2. Fellows should demonstrate the ability to work in a “split therapy” model when needed; this refers to a model of treatment in which the fellow is providing medical management and another clinician is providing specific psychosocial interventions (e.g., psychotherapy, behavioral management).

Neurobehavioral and Neuropsychiatric Syndromes

Fellows in Behavioral Neurology & Neuropsychiatry are expected to develop in-depth knowledge regarding the neuropsychiatric and neurobehavioral consequences of many neurological and psychiatric conditions. All fellows are expected to bring to subspecialty training the level of knowledge and clinical competence required by the ACGME-RRC in Neurology or Psychiatry for completion of and board-eligibility in the area of their pre-fellowship training (i.e., neurology, psychiatry, and/or both). However, since training in Behavioral Neurology & Neuropsychiatry may follow primary training in neurology, psychiatry, and/or pediatric neurology, it is not expected that the fellows will develop the same fund of knowledge or clinical competency in the management of the primary neurological or psychiatric disorders listed herein as that obtained by primary specialty training. Instead, it is expected that the fellow will develop sufficient knowledge regarding these conditions such that he or she can competently evaluate and manage their neurobehavioral and neuropsychiatric manifestations.

Given the limited duration of training in Behavioral Neurology & Neuropsychiatry, some fellows may have little direct experience evaluating and caring for patients with some of these problems during the period of fellowship training. The elements of the Core Curriculum described in sections I-III (above) are designed to ensure that fellows develop the knowledge base and clinical skills required to understand, evaluate, and treat patients with neurobehavioral and neuropsychiatric problems through mastery of the principles of Behavioral Neurology & Neuropsychiatry. In the service of preparing fellows to evaluate and treat neurobehavioral and neuropsychiatric problems arising in any of the conditions listed below, where such are known.

1. Knowledge of and indications for psychosocial interventions used in the care of patients with neurobehavioral and neuropsychiatric disorders, including supportive therapy, family therapy, other psychotherapeutic interventions relevant to the care of persons with neuropsychiatric and neurobehavioral disorders, including patient and family education, environmental interventions, behavioral management strategies, and use of and referral to community resources.

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Through these means, it is expected that the fellow will develop an advanced level of knowledge regarding the neurobehavioral and neuropsychiatric aspects, epidemiology, neurogenetics, putative neurological substrates, and typical neuropathological features of the conditions listed below, where such are known.

- Focal Neurobehavioral Syndromes, including disorders of arousal (e.g., coma, persistent vegetative state, minimally conscious state); perception (e.g., illusions, hallucinations, sensory impairments); attention (e.g., delirium, confusion, neglect/visuospatial disturbances); language (e.g., aphasias); memory (e.g., amnesias); praxis (e.g., apraxias); recognition (e.g., agnosias); executive function (e.g., dysexecutive syndrome); comportment and social behavior (e.g., disinhibition, witzelsucht, paroxysmal irritability and aggression [or organic aggressive syndrome], Kluver-Bucy syndrome, see also impulse control disorders, below); and motivation (e.g., apathy, abulia, akinetic mutism).
- Neuropsychiatric Syndromes, including attention-deficit and disruptive behavior disorders; learning, communication, and motor skill disorders; dyslexia; developmental disabilities (e.g., mental retardation); autism and pervasive developmental disorder; age-related cognitive impairment; amnestic disorders (e.g., alcohol amnestic disorder [or Korsakoff’s psychosis], transient global amnesia, posttraumatic amnesia, psychogenic amnesia); cortical, subcortical, white matter, and mixed dementias; substance abuse and dependence; disorders of mood (e.g., major depressive disorder, bipolar disorder); disorders of affect (e.g., pathological laughing and crying, affective
lability, essential crying, euphoria, placidity); anxiety disorders (e.g., panic disorder, posttraumatic stress disorder, generalized anxiety disorder, obsessive-compulsive disorder); psychotic disorders (e.g., schizophrenia, schizoaffective disorder, delusional disorders); personality disorders and personality change due to neurological/medical conditions; impulse control disorders (e.g., intermittent explosive disorder, aggression/rage due to neurological/medical conditions, hypersexuality, self-injurious behavior); somatoform disorders (e.g., somatization, conversion disorder); factitious disorders; malingering; sexual disorders; sleep disorders [see supplementary curricular content below]; and tic disorders, including Gilles de la Tourette’s syndrome.

• Cognitive, Emotional, and Behavioral Manifestations of Neurological Disorders, including neurodegenerative disorders (e.g., Alzheimer’s disease, frontotemporal dementia, diffuse Lewy body disease, Parkinson’s disease, Huntington’s disease); stroke and other cerebrovascular diseases (e.g., transient ischemic attack [TIA], reversible ischemic neurologic impairment [RIND], vascular dementias, intracranial hemorrhage, aneurysms, hypoxic-ischemic encephalopathy); epilepsy (e.g., primary and/or secondary generalized and/or partial seizures, Gastaut-Geschwind interictal personality syndrome, nonepileptic seizures); multiple sclerosis; traumatic brain injury; hydrocephalus (including normal pressure hydrocephalus); primary and secondary brain tumors; CNS infections (e.g., HIV, neurosyphilis, Lyme disease, herpes encephalitis, prion encephalopathies); neuroendocrine disorders (e.g., hypo- and hyperthyroidism, diabetes mellitus); toxic exposures/ingestions; metabolic disorders, including solid organ failure and transplantation and inborn errors of metabolism (e.g., adrenoleukodystrophy, phenylketonuria); movement disorders (e.g., Parkinson’s disease, Huntington’s disease, Wilson’s disease, acute and tardive movement disorders, psychogenic [conversion] movement disorders); headache (e.g., tension-type, migraines, cluster); acute and chronic pain; and collagen-vascular diseases (e.g., systemic lupus erythematosus).

Supplementary Curricular Content

Training programs may elect to facilitate the fellow’s development of special expertise and/or clinical competence in additional areas in Behavioral Neurology & Neuropsychiatry. Emphasis on these supplementary areas should not detract from the emphasis needed to master all of the elements of the Core Curriculum. Possible supplementary curricular content may include:

• Sleep disorders and polysomnography.
• Geriatric Behavioral Neurology & Neuropsychiatry.
• Pediatric Behavioral Neurology & Neuropsychiatry.
• Neuorehabilitation, including cognitive rehabilitation.
• Neurogenetics.
• Neuropsychiatry of substance abuse.
• Forensic Behavioral Neurology & Neuropsychiatry.
• Crisis intervention in Behavioral Neurology & Neuropsychiatry;
• Clinical or research neurophysiology, including electrophysiologic and neuromagnetic assessment techniques.
• Clinical or research neuroimaging, including advanced structural and functional imaging techniques.
• Neuropharmacology.
• Electroconvulsive therapy (ECT) and other brain stimulation techniques with potential therapeutic use (e.g., transcranial magnetic stimulation, vagal nerve stimulators, deep brain stimulators).
• Neuropathology.
• Epidemiology, public health, public policy, and/or public advocacy.
• Administration.
• Education.

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