

Behavioral Neurology & Neuropsychiatry Fellowship Core Curriculum

Goals and Objectives

The goals and objectives for training in Behavioral Neurology & Neuropsychiatry include:

1. Develop clinical expertise in care of patients with brain dysfunction including understanding of diagnostic skills, neurologic 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 neuropharmacologic agents, as well as the interactions of such agents with other medications on central nervous system 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.

Core Curricular Content

The core curriculum for Behavioral Neurology & Neuropsychiatry is composed of four primary content areas:

- I) Structural and Functional Neuroanatomy**
- II) Neurobehavioral and Neuropsychiatric Assessment**
- III) Treatments**
- IV) 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 of these core curricular content areas regardless of the specific clinical focus (eg, dementias, stroke, traumatic brain injury, etc.) of those programs. Fellows in Behavioral Neurology & Neuropsychiatry are expected to both complement and supplement their “bedside-learning” of the field through guided self-directed learning activities (ie, reading relevant textbooks and peer-reviewed articles) and didactic experiences (ie, seminars, case conferences, Grand Rounds, local or national conferences, etc.) related to the fourth core curricular content area (Neurobehavioral and Neuropsychiatric Syndromes).

I. Structural and Functional Neuroanatomy

A. The Fellow in Behavioral Neurology & Neuropsychiatry 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 central nervous system.

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

1. Cognition
 - a. Arousal
 - b. Perception
 - c. Attention
 - d. Language
 - e. Memory
 - f. Praxis
 - g. Recognition
 - h. Visuospatial function
 - i. Executive function
2. Emotion
 - a. Mood
 - b. Affect
 - c. Prosody (affective communication)
 - d.
3. Behavior
 - a. Motivation
 - b. Compartment
 - c. Personality

II. Neuropsychiatric Assessment

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

A. Neurological Examination

1. Elemental neurological function
 - a. Cranial nerves
 - b. Motor
 - c. Sensory
 - d. Coordination
 - e. Gait
 - f. 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.

B. Mental Status Examination

1. General Assessment
 - a. Appearance and behavior
 - b. Speech
 - c. Thought process
 - d. Thought content
 - e. Emotion
 - f. Comportment
 - g. Personality
2. Cognitive Examination
 - a. Arousal
 - b. Attention
 - c. Language
 - d. Memory
 - e. Praxis
 - f. Recognition
 - g. Visuospatial function
 - h. 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 structural and functional neuroanatomic correlates.
5. Developing 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.

C. Neuropsychological Assessment

1. The content, sensitivity, and specificity of neuropsychological testing, including:
 - a. Fixed assessment batteries.
 - b. Flexible batteries.
 - c. Projective testing.
 - d. 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 the 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 anatomic and disease correlates of neuropsychological test abnormalities.

D. 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.

* **Note:** The types of available neuroimaging methods and also their generally accepted clinical indications are likely to change over time. This element of the Core Curriculum may require revision as such changes occur.

E. Electrophysiologic Testing

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

* **Note:** The types of electrophysiology testing methods available as well as their generally accepted clinical indications are likely to change over time. This element of the Core Curriculum may require revision as such changes occur.

F. 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 cerebrospinal fluid examination relevant to the evaluation of patients with neuropsychiatric and neurobehavioral conditions.

G. 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 treatment plan for the neurobehavioral or neuropsychiatric condition.
5. Presentation, both verbally and in writing, of clinical impressions and recommendations derived from the comprehensive clinic assessment to:
 - a. The patient and his or her family
 - b. Other health care professionals
 - c. Officers of the court

- d. Other private or public agencies providing services to the patient.

III. Treatments

The Fellow in Behavioral Neurology & Neuropsychiatry 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:

A. 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 electroconvulsive therapy and neurosurgical procedures (i.e., ablative procedures, deep brain stimulators, vagus nerve stimulators, etc.) and other somatic therapies (e.g., transcranial magnet stimulation) in the treatment of patients with neurobehavioral and neuropsychiatric disorders.

B. Psychosocial Interventions

1. Knowledge of and indications for psychosocial interventions used in the care of patients with neurobehavioral and neuropsychiatric disorders, including:
 - a. Supportive therapy, family therapy, other psychotherapeutic interventions relevant to the care of persons with neuropsychiatric and neurobehavioral disorders
 - b. Patient and family education
 - c. Environmental interventions
 - d. Behavioral management strategies
 - e. 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 (eg, psychotherapy, behavioral management, etc.).

IV. 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 (ie, neurology, psychiatry, or both). However, *since training in Behavioral Neurology & Neuropsychiatry may follow primary training in either neurology or psychiatry, 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 the principles of Behavioral Neurology & Neuropsychiatry. In the service of preparing Fellows to provide care for persons neurobehavioral and neuropsychiatric problems arising in the context of the broad range of conditions in which such problems develop, Fellows are expected to both complement and supplement “bedside-learning” through guided self-directed learning activities and/or didactic experiences. Guided self-directed learning activities may include reading relevant textbooks, peer-reviewed articles, or other materials recommended by training program faculty. Didactic experiences may include seminars or other course work provided by the training program itself or by other programs either within or affiliated with the institution in which the fellowship training occurs. Additionally, Fellows should be encouraged to attend local or national conferences relevant to this aspect of training in Behavioral Neurology & Neuropsychiatry.

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.

A. Focal Neurobehavioral Syndromes, including disorders of:

1. Arousal (e.g., coma, persistent vegetative state, minimally conscious state, etc.)
2. Perception (e.g., illusions, hallucinations, sensory impairments)
3. Attention (e.g., delirium, confusion, neglect/visuospatial disturbances)
4. Language (e.g., the aphasias)
5. Memory (e.g., the amnesias)
6. Praxis (e.g., the apraxias)
7. Recognition (e.g., the agnosias)
8. Executive function (e.g., dysexecutive syndrome)
9. Comportment and social behavior (e.g., disinhibition, *witzelsucht*, paroxysmal irritability and aggression [or “organic aggressive syndrome”], Klüver-Bucy syndrome, etc.; see also impulse-control disorders, below)
10. Motivation (e.g., apathy, abulia, akinetic mutism)

B. Neuropsychiatric Syndromes

1. Attention-deficit and disruptive behavior disorders
2. Learning, communication, and motor skill disorders
3. Dyslexia
4. Developmental disabilities, including mental retardation
5. Autism and pervasive developmental disorder
6. Age-related cognitive impairment
7. Amnesic disorders (e.g., alcohol amnesic disorder [or Korsakoff’s psychosis], transient global amnesia, posttraumatic amnesia, psychogenic amnesia)
8. Cortical, subcortical, white matter, and mixed dementias

9. Substance abuse and dependence
10. Disorders of mood (e.g., major depressive disorder, bipolar disorder, etc.)
11. Disorders of affect (e.g., pathological laughing and crying, affective lability, essential crying, euphoria, placidity, etc.)
12. Anxiety disorders (e.g., panic disorder, post-traumatic stress disorder, generalized anxiety disorder, obsessive-compulsive disorder)
13. Psychotic disorders (e.g., schizophrenia, schizoaffective disorder, delusional disorders)
14. Personality disorders and personality change due to neurological/medical conditions
15. Impulse control disorders (e.g., intermittent explosive disorder, aggression/rage due to neurological/medical conditions, hypersexuality, self-injurious behavior, etc.)
16. Somatoform disorders (e.g., somatization, conversion disorder, etc.)
17. Factitious disorders
18. Malingering
19. Sexual disorders
20. Sleep disorders (see also *Supplementary Curricular Content*, below)
21. Tic disorders, including Gilles de la Tourette's syndrome

C. Cognitive, Emotional, and Behavioral Manifestations of Neurological Disorders

1. Neurodegenerative disorders (e.g., Alzheimer's disease, frontotemporal dementia, diffuse Lewy body disease, Parkinson's disease, Huntington's disease, etc.)
2. Stroke and other cerebrovascular diseases (e.g., transient ischemic attack [TIA], reversible ischemic neurologic impairment [RIND], vascular dementias, intracranial hemorrhage, aneurysms, hypoxic-ischemic encephalopathy)
3. Epilepsy (e.g., primary and/or secondary generalized and/or partial seizures, Gastaut-Geschwind interictal personality syndrome, non-epileptic seizures)
4. Multiple sclerosis
5. Traumatic brain injury
6. Hydrocephalus (including normal pressure hydrocephalus)
7. Primary and secondary brain tumors
8. Central nervous system infections (e.g., HIV, neurosyphilis, Lyme disease, herpes encephalitis, prion encephalopathies)
9. Neuroendocrine disorders (e.g., hypo- and hyperthyroidism, diabetes mellitus, etc.)
10. Toxic exposures/ingestions
11. Metabolic disorders, including solid organ failure and transplantation and inborn errors of metabolism (e.g., adrenoleukodystrophy, phenylketonuria, etc.)
12. Movement disorders (e.g., Parkinson's disease, Huntington's disease, Wilson's disease, acute and tardive movement disorders, psychogenic [conversion] movement disorders)
13. Headache (e.g., tension-type, migraines, cluster, etc.)
14. Acute and chronic pain
15. Collagen-vascular diseases, including 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:

1. Sleep Disorders and Polysomnography
2. Geriatric Behavioral Neurology & Neuropsychiatry
3. Pediatric Behavioral Neurology & Neuropsychiatry
4. Neurorehabilitation, including Cognitive Rehabilitation
5. Neurogenetics
6. Neuropsychiatry of Substance Abuse
7. Forensic Behavioral Neurology & Neuropsychiatry
8. Crisis Intervention in Behavioral Neurology & Neuropsychiatry
9. Clinical or Research Neurophysiology (including electrodiagnostic and neuromagnetic assessment techniques)
10. Clinical or Research Neuroimaging (including advanced structural and functional imaging techniques)
11. Neuropharmacology
12. Transcranial Magnetic Stimulation and Electroconvulsive Therapy
13. Neuropathology
14. Epidemiology, Public Health, Public Policy, and/or Public Advocacy
15. Administration
16. Education

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