

# American Board of Psychiatry and Neurology Clinical Neurophysiology Core Competencies Outline

## I. Clinical Neurophysiology Patient Care and Procedural Skills Core Competencies

- A. General: Clinical neurophysiologists shall demonstrate the following abilities:
1. To perform and document a relevant history and examination on culturally diverse patients<sup>1</sup> to include as appropriate:
    - a. Chief complaint
    - b. History of present illness
    - c. Past medical history
    - d. A comprehensive review of systems
    - e. A biological family history
    - f. A sociocultural history<sup>2</sup>
    - g. A developmental history (especially for children)
    - h. A situationally germane general and neurologic examination
  2. To delineate appropriate differential diagnoses
  3. To evaluate, assess, and recommend effective management of patients
- B. For Clinical Neurophysiology (CNP): Based on a comprehensive neurologic assessment, clinical neurophysiologists shall demonstrate the following abilities:
1. To determine:
    - a. If a patient's symptoms are the result of a disease affecting the central and/or peripheral nervous system or are of another origin (e.g., of a systemic or psychiatric illness) by performing appropriate CNP testing
    - b. A formulation, differential diagnosis, laboratory investigation, and management plan
    - c. Use of appropriate CNP tests to evaluate and manage patients
  2. To develop and maintain the technical skills to:
    - a. Perform and/or interpret CNP testing
    - b. Identify and discriminate among the neurologic disorders of the central and peripheral nervous systems that are diagnosed based on CNP testing
  3. To provide a compassionate and appropriate approach to patient care in the performance of CNP studies

## II. Clinical Neurophysiology Medical Knowledge Core Competencies

- A. General: Clinical neurophysiologists shall demonstrate the following:
1. Knowledge of major disorders, including considerations relating to age, gender, race, and ethnicity, based on the literature and standards of practice. This knowledge shall include:
    - a. The phenomenology of the disorder
    - b. The etiology of the disorder, including medical, genetic, and

- sociocultural factors
    - c. The epidemiology of the disorder
    - d. An understanding of the impact of physical illness on the patient's functioning
    - e. The experience, meaning, and explanation of the illness for the patient and family, including the influence of cultural factors and culture-bound syndromes
    - f. Effective treatment strategies
    - g. Course and prognosis
  - 2. Knowledge of health care delivery systems, including patient and family counseling
  - 3. Knowledge of the application of ethical principles in delivering medical care
  - 4. Ability to utilize electronic reference systems to access medical, scientific, and patient information
- B. For certification in CNP: Clinical neurophysiologists shall demonstrate the following:
1. Knowledge of basic neuroscience that is critical to the practice of CNP
  2. Knowledge of normal physiology of the nervous system and pathophysiology of neurologic disorders diagnosed with CNP testing, and familiarity with the scientific basis of neurologic diseases and CNP, including:
    - a. Physiology
      - (1) Potentials: resting, action, conduction
      - (2) Synaptic transmission: neuromuscular junction (NMJ), central
      - (3) Generators: anatomy, mechanisms
      - (4) Temperature effects
      - (5) Volume conduction: polarity, far-/near-field
    - b. Neuroanatomy
    - c. Instrumentation
  3. Skills needed to interpret electroencephalography (EEG) and to know normal and abnormal patterns and their clinical correlations. This includes the following:
    - a. Methods
      - (1) Techniques: activation, other
      - (2) Artifacts: specific EEG, physiologic, instrumental
    - b. Basic patterns
      - (1) Maturation and age-related changes
      - (2) Variants: normal and uncommon
    - c. Clinical correlations
      - (1) Seizures and other paroxysmal events
      - (2) Focal lesions
      - (3) Diffuse encephalopathies: coma, death
      - (4) Drugs and treatment effects

- (5) Periodic and uncertain patterns
- (6) Pediatric disorders
- 4. Skills needed to perform and interpret nerve conduction studies and electromyography (NCS/EMG) and to know the normal and abnormal findings and their clinical correlations. This includes the following:
  - a. Methods
    - (1) Anatomy
    - (2) Techniques: NCS, EMG, repetitive stimulation, and single fiber EMG
  - b. Basic patterns: NCS, EMG, repetitive stimulation, artifacts
  - c. Clinical correlations
    - (1) Peripheral nerve disease: diffuse axonal or demyelinating types, focal, multifocal, cranial and hyperexcitability states of nerve and muscle
    - (2) Central disease: amyotrophic lateral sclerosis (ALS), other motor neuron diseases, spinal cord, and brainstem
    - (3) NMJ disease: myasthenia gravis, myasthenic syndrome, botulism, and others
    - (4) Muscle disease: inflammatory, dystrophy, metabolic/toxic, channelopathies
    - (5) Pediatric disorders
    - (6) Patterns: prognosis, evolution of disease
- 5. Other CNP skills, as follows:
  - a. Sleep
  - b. Evoked potentials
  - c. Autonomic studies
  - d. Safety
  - e. Electrophysiologic evaluation of movement disorders
  - f. Intraoperative and ICU monitoring

C. For maintenance of certification in EEG emphasis

- 1. Clinical neurophysiologists specializing in EEG shall acquire and maintain the skills to interpret the EEG and to know normal and abnormal patterns and their clinical correlations. This includes the following:
  - a. Methods
    - (1) Techniques: activation, other
    - (2) Artifacts: specific EEG, physiologic, instrumental
  - b. Basic patterns
    - (1) Maturation and age-related changes
    - (2) Variants: normal and uncommon
  - c. Clinical correlations
    - (1) Seizures and other paroxysmal events
    - (2) Focal lesions
    - (3) Diffuse encephalopathies: coma, death
    - (4) Drugs and treatment effects
    - (5) Periodic and uncertain patterns

- (6) Pediatric disorders
  - 2. Clinical neurophysiologists specializing in EEG shall be knowledgeable about the clinical correlations of NCS and EMG of:
    - a. Peripheral nerve disease: diffuse, focal
    - b. Central disease: motor neuron, cord, stem
    - c. NMJ disease
    - d. Muscle disease
    - e. Pediatric disorders
    - f. Patterns: prognosis, evolution of disease
  - 3. Clinical neurophysiologists specializing in EEG shall be knowledgeable about the utilization and clinical correlations of:
    - a. Sleep
    - b. Evoked potentials
    - c. Autonomic studies
    - d. Safety
    - e. Electrophysiologic evaluation of movement disorders
    - f. Intraoperative and ICU monitoring
- D. For maintenance of certification in NCS/EMG emphasis
- 1. Clinical neurophysiologists specializing in NCS/EMG shall acquire and maintain technical skills to perform and interpret NCS/EMG studies and to know the normal and abnormal findings and their clinical correlations. This includes the following:
    - a. Methods
      - (1) Anatomy
      - (2) Techniques: NCS, EMG, repetitive stimulation, and SFEMG
    - b. Basic patterns: NCS, EMG, repetitive stimulation, artifacts
    - c. Clinical correlations
      - (1) Peripheral nerve disease: diffuse axonal or demyelinating types, focal, multifocal, cranial and hyperexcitability states of nerve and muscle
      - (2) Central disease: ALS, other motor neuron diseases, spinal cord, and brainstem
      - (3) NMJ disease: myasthenia gravis, myasthenic syndrome, botulism, and others
      - (4) Muscle disease: inflammatory, dystrophy, metabolic/toxic, channelopathies
      - (5) Pediatric disorders
      - (6) Patterns: prognosis, evolution of disease
  - 2. Clinical neurophysiologists specializing in NCS/EMG shall be knowledgeable about basic EEG patterns and clinical correlations of:
    - a. Seizures and other paroxysmal events
    - b. Focal lesions
    - c. Diffuse encephalopathies: coma, death
    - d. Drugs and treatment effects

- e. Periodic and uncertain patterns
- f. Pediatric disorders
- 3. Clinical neurophysiologists specializing in NCS/EMG shall be knowledgeable about the utilization and clinical correlations of of:
  - a. Sleep
  - b. Evoked potentials
  - c. Autonomic studies
  - d. Safety
  - e. Electrophysiologic evaluation of movement disorders
  - f. Intraoperative and ICU monitoring

### **III. Clinical Neurophysiology Interpersonal and Communications Skills Core Competencies**

- A. Clinical neurophysiologists shall demonstrate the following abilities:
  - 1. To listen to and understand patients and to attend to nonverbal communication
  - 2. To communicate effectively with patients using verbal, nonverbal, and written skills as appropriate
  - 3. To develop and maintain a therapeutic alliance with patients by instilling feelings of trust, honesty, openness, rapport, and comfort in their relationships with clinical neurophysiologists
  - 4. To partner with referring physicians and patients to develop a management plan
  - 5. To transmit test results to referring physicians and patients clearly and in a timely manner
  - 6. To be aware of the potential impact of the clinical neurophysiologist's own feelings and behavior so that these do not interfere with appropriate treatment
  - 7. To communicate effectively and work collaboratively with allied health care professionals and with other professionals involved in the care of patients and their families
  - 8. To educate patients, their families, and professionals about medical, psychosocial, and behavioral issues
- B. Clinical neurophysiologists shall demonstrate the ability to obtain, interpret, and evaluate consultations from other medical specialties. This shall include:
  - 1. Knowing when to solicit consultation and having the sensitivity to assess the need for consultation
  - 2. Formulating and clearly communicating the consultation question
  - 3. Discussing the consultation findings with the consultant
  - 4. Discussing the consultation findings with the patient and family
- C. Clinical neurophysiologists shall serve as effective consultants to other medical specialists, mental health professionals, and community agencies by demonstrating the abilities to:

1. Communicate effectively with the requesting party to refine the consultation question
  2. Maintain the role of consultant
  3. Communicate clear and specific recommendations
  4. Respect the knowledge and expertise of the requesting professionals
  5. Provide timely access to CNP testing, especially in emergency situations and in patients with critical illness
- D. Clinical neurophysiologists shall demonstrate the ability to communicate effectively with patients and their families by:
1. Gearing all communication to the educational and intellectual levels of patients and their families
  2. Demonstrating sociocultural sensitivity to patients and their families
  3. Providing explanations of neurologic disorders and treatment that are jargon-free and geared to the educational/intellectual levels of patients and their families
  4. Providing preventive education that is understandable and practical
  5. Respecting the patients' cultural, ethnic, religious, and economic backgrounds
  6. Developing and enhancing rapport and a working alliance with patients and their families
  7. Ensuring that the patient and/or family have understood the communication
  8. Responding promptly to electronic communications when used as a communication method agreed upon by clinical neurophysiologists and their patients and patients' families
- E. Clinical neurophysiologists shall maintain up-to-date medical records and write legible prescriptions and other orders. These records must capture essential information while simultaneously respecting patient privacy, and they must be useful to health professionals outside neurology. They must provide timely and clinically useful reports of CNP testing, using language understandable to referring care providers.
- F. Clinical neurophysiologists shall demonstrate the ability to effectively lead a multidisciplinary treatment team, including being able to:
1. Listen effectively
  2. Elicit needed information from team members
  3. Integrate information from different disciplines
  4. Manage conflict
  5. Clearly communicate an integrated treatment plan
  6. Learn to organize, operate, and lead a CNP laboratory
  7. Communicate effectively with and provide structured supervision and training of CNP technical personnel
  8. Promote a collegial relationship among all personnel, including technicians and/or trainees

- G. Clinical neurophysiologists shall demonstrate the ability to communicate effectively with patients and their families while respecting confidentiality. Such communication may include:
1. The results of the assessment
  2. Use of informed consent when considering investigative procedures
  3. Genetic counseling and palliative care when appropriate
  4. Use of consideration and compassion for the patient in providing accurate medical information and prognosis
  5. The risks and benefits of the proposed treatment plan, including possible side effects of medications and/or complications of nonpharmacologic treatments
  6. Alternatives (if any) to the proposed treatment plan
  7. Appropriate education concerning the disorder, its prognosis, and prevention strategies

#### **IV. Clinical Neurophysiology Practice-Based Learning and Improvement Core Competencies**

- A. Clinical neurophysiologists shall recognize limitations in their own knowledge base and clinical skills, and understand and address the need for lifelong learning.
- B. Clinical neurophysiologists shall demonstrate appropriate skills for obtaining and evaluating up-to-date information from scientific and practice literature and other sources to assist in the quality care of patients. This shall include, but not be limited to:
1. Use of medical libraries, including up-to-date core textbooks and core journals
  2. Use of information technology, including Internet-based searches and literature databases
  3. Use of drug information databases
  4. Active participation, as appropriate, in educational courses, conferences, and other organized educational activities both at the local and national levels
- C. Clinical neurophysiologists shall evaluate caseload and practice experience in a systematic manner. This may include:
1. Case-based learning
  2. Use of best practices through practice guidelines or clinical pathways
  3. The review of patient records
  4. Obtaining evaluations from patients (e.g., outcomes and patient satisfaction)
  5. Employment of principles of quality improvement in practice
  6. Obtaining appropriate supervision and consultation
  7. Maintaining a system for examining errors in practice and initiating improvements to eliminate or reduce errors

- D. Clinical neurophysiologists shall demonstrate the ability to critically evaluate relevant medical literature. This ability may include:
  - 1. Using knowledge of common methodologies employed in neurologic research
  - 2. Researching and summarizing a particular problem that derives from their own caseloads
  
- E. Clinical neurophysiologists shall demonstrate the following abilities:
  - 1. To review and critically assess scientific literature to determine how quality of care can be improved in relation to one's practice (e.g., reliable and valid assessment techniques, treatment approaches with established effectiveness, practice parameter adherence). Within this aim, clinical neurophysiologists shall be able to assess the generalizability or applicability of research findings to their patients in relation to their sociodemographic and clinical characteristics.
  - 2. To develop and pursue effective remediation strategies that are based on critical review of the scientific literature
  - 3. To know and recognize the normal and abnormal findings of CNP studies in patients of all ages
  - 4. To appropriately use and interpret CNP tests in the evaluation of the patient's problem
  - 5. To recognize personal limitations and knowledge of performing and interpreting CNP tests and when to seek guidance
  - 6. To continue to develop medical knowledge and the application of this knowledge to patient care
  - 7. To continue to develop and improve skills in performing appropriate CNP tests

**V. Clinical Neurophysiology Professionalism Core Competencies**

- A. Clinical neurophysiologists shall demonstrate responsibility for their patients' care, including:
  - 1. Responding to communication from patients and health professionals in a timely manner
  - 2. Establishing and communicating back-up arrangements, including how to seek emergent and urgent care when necessary
  - 3. Using medical records for appropriate documentation of the course of illness and its diagnosis and treatment
  - 4. Providing coverage if unavailable (e.g., when out of town or on vacation)
  - 5. Coordinating care with other members of the medical and/or multidisciplinary team
  - 6. Providing for continuity of care, including appropriate consultation, transfer, or referral if necessary
  
- B. Clinical neurophysiologists shall demonstrate ethical behavior, integrity, honesty,

compassion, and confidentiality in the delivery of care, including matters of informed consent/assent, professional conduct, and conflict of interest.

- C. Clinical neurophysiologists shall demonstrate respect for patients and their families, and their colleagues as persons, including their ages, cultures, disabilities, ethnicities, genders, socioeconomic backgrounds, religious beliefs, political leanings, and sexual orientations.
- D. Clinical neurophysiologists shall demonstrate understanding of and sensitivity to end-of-life care and issues regarding provision of care.
- E. Clinical neurophysiologists shall review their professional conduct and remediate when appropriate.
- F. Clinical neurophysiologists shall participate in the review of the professional conduct of their colleagues.

## **VI. Clinical Neurophysiology Systems-Based Practice Core Competencies**

- A. Clinical neurophysiologists shall have a working knowledge of the diverse systems involved in treating patients of all ages, and understand how to use the systems as part of a comprehensive system of care in general and as part of a comprehensive, individualized treatment plan. This shall include the:
  - 1. Use of practice guidelines
  - 2. Ability to access community, national, and allied health professional resources that may enhance the quality of life of patients with chronic neurologic disease
  - 3. Demonstration of the ability to lead and delegate authority to health care teams needed to provide comprehensive care for patients with neurologic disease
  - 4. Demonstration of skills for the practice of ambulatory medicine, including time management, clinical scheduling, and efficient communication with referring physicians
  - 5. Use of appropriate consultation and referral mechanisms for the optimal clinical management of patients
  - 6. Demonstration of awareness of the importance of adequate cross-coverage
  - 7. Use of accurate medical data in the communication with, and effective management of, patients
  - 8. Understanding of appropriate reasons for obtaining or performing CNP studies, and performing the studies that are appropriate for the patient's condition
  - 9. Understanding of practice parameters, resources, and costs of CNP procedures, and recommending or performing appropriate studies for patient's condition
  - 10. Understanding of ethical and legal implications of performing and

interpreting studies

11. Understanding of billing, coding, and documentation procedures

- B. In the community system, clinical neurophysiologists shall:
1. Recognize the limitation of health care resources and demonstrate the ability to act as an advocate for patients within their sociocultural and financial constraints
  2. Demonstrate knowledge of the legal aspects of neurologic diseases as they impact patients and their families
  3. Demonstrate an understanding of risk management
- C. Clinical neurophysiologists shall demonstrate knowledge of, and interact with, managed health systems, including:
1. Participating in utilization review communications and, when appropriate, advocating for quality patient care
  2. Educating patients concerning such systems of care
- D. Clinical neurophysiologists shall demonstrate knowledge of community systems of care and assist patients to access appropriate care and other support services. This requires knowledge of treatment settings in the community, which include ambulatory, consulting, acute care, skilled care, rehabilitation, nursing homes and home care facilities, and hospice organizations. Clinical neurophysiologists shall demonstrate knowledge of the organization of care in each relevant delivery setting and the ability to integrate the care of patients across such settings.
- E. Clinical neurophysiologists shall be aware of safety issues, including acknowledging and remedying medical errors, should they occur.

<sup>1</sup>Cultural diversity includes issues of race, gender, language, age, country of origin, sexual orientation, religious/spiritual beliefs, sociocultural class, educational/intellectual levels, and physical disability. Working with a culturally diverse population requires knowledge about cultural factors in the delivery of health care. For the purposes of this document, all patient and peer populations are to be considered culturally diverse.

<sup>2</sup>Regarding sociocultural issues, for the purposes of this document, “family” is defined as those having a biological or otherwise meaningful relationship with the patient. Such “significant others” are to be defined from the patient’s point of view.

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