Neural Repair and Rehabilitation
Core Curriculum and Core Content

I. Core Curriculum

1. Program Content
Neurorehabilitation fellows will have training and have had exposure to the content areas of neurorehabilitation outlined in the core content section by way of clinical responsibilities, didactic teaching, observation, interaction with experts, directed readings and other methods. Some areas are key for a neurorehabilitation specialist and will be required content areas for all fellowships. Some of these areas will require proficient knowledge and skill, these areas are indicated by 2 asterisks (**). Some areas must be a part of the fellow’s experience in order to develop competence and at least basic proficiency, these areas are indicated by 1 asterisk (*). The remaining areas are recommended but optional program content components and level of exposure will depend on the emphasis, interests and expertise available in particular training programs. Programs that lack patients or clinical offerings in particular content areas may offer fellows exposure to these areas in other facilities or through other instructional methods.

2. Goals
To provide training and experience in the clinical management and rehabilitative treatment of the common neurological problems that lead to functional disabilities and loss of participation in society and to provide the opportunity to acquire knowledge in other areas of neurologic rehabilitation, including related basic sciences. To provide an understanding of scientific inquiry related to neurorehabilitation and, if possible, the opportunity to participate in research in an area of neurorehabilitation.

3. Objectives
Trainees should:
• Demonstrate proficiency in the management of rehabilitation issues for patients with stroke, brain injury, spinal cord injury and multiple sclerosis.
• Demonstrate competence in rehabilitation management of patients with other problems and disorders including chronic pain, neuromuscular disease, multiple systems disorders, degenerative disorders and aging.
• Have the opportunity to practice other areas that may be part of neurorehabilitative practice such as pediatric problems, neuro-urology, sexuality, disability evaluations, orthotics, wheelchairs and adaptive equipment, speech and swallowing disorders, neural prostheses, management of medical problems complicating rehabilitation, pharmacologic treatments in rehabilitation, rehabilitation of cognitive and behavioral problems, new and emerging technologies (e.g. robotics), and economic aspects of rehabilitation.
• Recognize the fundamentals of neurologic recovery, regeneration and plasticity, and their interaction with rehabilitation interventions, learning and environmental influences in the rehabilitative process.
• Practice working with an interdisciplinary rehabilitation team and understand the rules and responsibilities of team members.
• Distinguish psychological and social issues faced by patients and families involved in rehabilitation.
• Differentiate the relationship between cognitive dysfunction and depression in recovery, and treatment of these problems.
• Describe the practice of neurorehabilitation in the context of the resources and constraints of the health care system, and changing regulatory environments.
• Employ a basic science or clinical neurorehabilitation research project.

Training programs should:
• Assure trainees illustrate competence in providing appropriate, companionate and effective neurorehabilitative patient care.
• Assure trainees acquire biomedical and clinical knowledge of neurorehabilitation that can be applied to patient care.
• Describe systems-based practice, including awareness of the larger context of the health care system, its resources and constraints.
• Assure that their program provides the recommended knowledge base adequate for future practitioners of neurorehabilitation.
• Provide an environment for fellow to acquire the knowledge and skills to be confident and competent practitioners in neurorehabilitation.
• Maintain a curriculum that will provide the basis for successful completion of the UCNS certification examination.
• Choose practice-based learning and improvement that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care in neurorehabilitation.
• Assure that fellows apply interpersonal and communication skills to collaborate with other members of the rehabilitation team and communicate with patients and families.
• Assure that fellows practice professionalism in carrying out responsibilities, adhering to ethical principles of medical practice and possessing sensitivity to diverse patient populations.
4. Methods of Training to be Used

Clinical component:
Fellows will evaluate and manage neurorehabilitative care for a minimum of 50 patients with faculty supervision. These patients should include those with stroke, brain injury, spinal cord disorders, and multiple sclerosis, as well as other neurologic disorders. Fellows should evaluate and follow patients through the rehabilitation process for a minimum of 10 months during the fellowship. They should learn and become proficient in neurologic rehabilitation evaluation and documentation that adds the rehabilitation perspective to the traditional neurological evaluation and communicates information that can be used by the rehabilitation team. They should have the opportunity to interact with the rehabilitation team through formal team conferences and other venues. They should have the opportunity to evaluate and follow outpatients with rehabilitation needs through a regular clinic. Fellows should be directly supervised in their clinical work by faculty with significant background and experience in aspects of neurorehabilitation. There should be opportunity for clinical teaching rounds. Other clinical experiences may involve rotations in specialty programs and clinics related to neurorehabilitation such as: neuromuscular blocks (e.g. Botox, phenol); clinics for specific disorders (e.g., multiple sclerosis, stroke, pain, etc.); clinics in other related disciplines (e.g., behavioral neurology, neuro-urolgy, geriatrics, movement disorders, etc.); prosthetics; bracing; casting; wheelchair clinics; therapy sessions; special rehabilitative techniques and technologies (e.g. constraint-induced movement therapy; robotics; partial weight support ambulation; functional electrical stimulation, cognitive rehabilitation etc.); and other relevant clinical experiences.

Didactic component:
Fellows must have formal scheduled teaching sessions with faculty in lecture and discussions within a small group format. Formal presentations by program and outside faculty should be available on a variety of topics related to neurorehabilitation. Fellows may have the opportunity to attend didactic programs on neurorehabilitation at nearby facilities and should be provided opportunities to attend national or local neurorehabilitation conferences.

Research component:
An active research component is a benefit to a training program and fellows may have the opportunity to participate in faculty supervised research during the course of their fellowship. The emphasis on research will vary and the amount of time spent dedicated to research in the first year of a fellowship should not exceed 20% of the fellow’s time. Research involvement may extend beyond the duration of a one year fellowship or part of a second year of fellowship, if offered.

Self-study component:
Fellows should receive a reference and reading list at the start of the fellowship. In addition, faculty will provide trainees with suggested readings and articles throughout the fellowship. Review and critique of journal articles and current research sessions may also be a part of this component. Trainees will have access to major journals and texts on rehabilitation topics.
5. Methods of Evaluation
Neurorehabilitation training programs must be systematically evaluated on a yearly basis. The review should be carried out by the program director, other key faculty and should include present and former fellows. The assessment should include information from fellows’ evaluations of the program and faculty, evaluation by faculty of fellows’ performance during the fellowship and performance of graduates on certification exams. The fellowship directors should also seek feedback on their programs from former fellows who have completed the program and have gone on to positions in neurorehabilitation.

6. Methods of Feedback
The program director should produce a yearly report that includes the strengths and weaknesses of the fellowship program based on the yearly evaluation. The evaluation should generate a set of recommendations for program improvement and include methods for evaluating improvement on subsequent evaluations. The core curriculum has been distributed for comment to fellowship directors and other interested organizations including the Board of the Association of Academic Physiatrists (AAP), and BAAR, joint committee of leadership from the AAPM&R, AAP and the American Board of PM&R.

II. Core Content
The core curriculum for neurorehabilitation can be divided into the following content areas that cover the basic science and theoretical underpinnings of neurologic recovery, and the disease areas, syndromes, treatment procedures and processes that make up clinical neurorehabilitation. Asterisks indicate areas of priority for fellowship training – ** High proficiency expected, * basic proficiency expected.

I. Basic mechanisms of recovery from neural injury
1. Neuroplasticity – synaptic, network**
2. Neural Repair and regeneration**
3. Learning, behavioral adaptation and compensation**
4. Muscle plasticity and Exercise**

II. Neurorehabilitation for Specific Disorders
1. Cerebrovascular disease and stroke (including specific stroke syndromes)**
2. Brain injury – traumatic, anoxic, other non-traumatic causes**
3. Spinal cord injury and dysfunction**
4. Multiple Sclerosis**
5. Neuromuscular disorders and Motor Neuron diseases*
6. Parkinson’s disease and other movement disorders*
7. Alzheimer’s disease, other degenerative disorders and aging
8. Pediatric neurorehabilitative disorders
9. Congenital and acquired developmental brain disorders (e.g. Cerebral palsy and Autism spectrum disorders).
III. Content components for each disorder
1. Epidemiology
2. Pathophysiology
3. Diagnosis and differential diagnosis
4. Natural history and prognosis (functional outcomes)
5. Neuromedical complications
6. Rehabilitation interventions - inpatient, outpatient, long-term
7. Special problems
8. Psychosocial issues
9. Prevention and pharmacological treatment to limit damage and promote recovery and function

IV. Neurorehabilitation for Symptoms and syndromes
1. Cognitive Disorders – including attention, memory, visuospatial and executive function disorders*
2. Speech and language disorders**
3. Disorders of consciousness*
4. Pain*
5. Weakness and Spasticity**
6. Movement disorders*
7. Sensory impairment*
8. Vision and hearing impairments and other special senses
9. Autonomic disorders*
10. Neurogenic bladder*
11. Dysphagia**
12. Balance and gait disorders**
13. Vestibular and visual-oculomotor problems*
14. Psychological issues*
15. Sexual dysfunction
16. Fatigue, deconditioning, energy expenditure problems*
17. Sleep disorders*

V. Interaction with multidisciplinary rehabilitation team (including understanding assessments by other disciplines)**
1. Physical Medicine and Rehabilitation
2. Neurology
3. Internal medicine and other primary care
4. Physician extenders (nurse practitioners, physician assistants)
5. Other medical specialties
6. Optometry and low vision rehab
7. Physical therapy
8. Occupational therapy
9. Speech / language therapy
10. Other therapy specialties – e.g. recreation, music, art
11. Case management
12. Rehabilitation Nursing
13. Rehabilitation psychology
14. Neuropsychology
15. Vocational rehabilitation
16. Orthotist
17. Prosthetist
18. Social Services
19. Legal, ethical services, clergy
20. Team structure and functioning
21. Patient and family education
22. Rehabilitation administration
23. Rehabilitation settings: acute hospital, chronic hospital, inpatient rehabilitation facility, skilled nursing facility, outpatient facilities, residential facilities, in-home rehabilitation

VI. Medical Rehabilitative Management
1. Pharmacologic treatments**
2. Neuromuscular blocks*
3. Intrathecal baclofen*
4. Deep vein thrombosis prevention**
5. Skin protection and breakdown*
6. Bladder and bowel dysfunction**
7. Electrodiagnostics – EMG, EEG, EPs
8. Neuroimaging – structural and functional*
9. Newer technologies and treatments – e.g., deep brain stimulation, cell transplants, ablation procedures

VII. Other Rehabilitative Methods
1. Outcome measurement and assessments**
2. Orthotics and prosthetics*
3. Bracing*
4. Casting and splinting*
5. Wheelchairs and adaptive equipment*
6. Augmentative communication and environmental control technologies
7. Emerging and investigational technologies (e.g., robotics, TMS and direct current electrical stimulation, functional electrical stimulation, cognitive rehabilitation, brain-behavior interfaces, virtual reality)