



American Academy of Neurology guidelines for credentialing in neuroimaging

Report from the task force on updating guidelines for credentialing in neuroimaging

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The current policy of the American Academy of Neurology (AAN) was approved in principle by its Executive Board in December 1975: "Neuroimaging is an integral part of the practice of neurology that requires broad knowledge of neuroanatomy, neuropathology, pathophysiology, and clinical neurologic disorders. Proper interpretation of neuroimaging requires knowledge of the effects of disease on the neuroimaging examination, its indications, performance and interpretation."

In addition, the American Medical Association (AMA) has clearly stated its position regarding jurisdictional disputes among medical specialists: "The AMA believes that (1) individual character, training, competence, experience, and judgment should be the criteria for granting privileges in hospitals; and (2) physicians representing several specialties can and should be permitted to perform the same procedures if they meet these criteria (Res. 26, A-77; Reaffirmed CLRPD Rep. C, A-89)."^{1,2} This position was ratified by the AMA House of Delegates in its interim meeting of 1994 by having approved the following resolution submitted by the AAN:

WHEREAS physicians have often been denied privileges to perform a cross-specialty service primarily because the physicians' specialty is different from the specialty

that has the most influence over institutional policies relating to that service area; and

WHEREAS such denials may restrict patient access to care and impede improvements in quality of care by excluding physicians with adequate training and experience and who have an important perspective on a particular field,

BE IT RESOLVED that the AMA supports the policy that hospitals and other institutions should allow physician staff to provide any service for which they have adequate training and experience, regardless of specialty, and should use quality of patient care as the only reason for denying privileges.

The Neuroimaging Subcommittee of the Practice Committee of the AAN recognized the need to update the AAN guidelines for credentialing neurologists in the practice of neuroimaging. The objective is to have the revised guidelines published and therefore available as an official source of information for credential committees in health care facilities across the country. To update the AAN guidelines, the Subcommittee appointed a task force to review the existing guidelines and revise them according to the present status of the various disciplines that constitute the subspecialty of neuroimaging.

Methodology. The task force included neurologists with expertise in various neuroimaging tech-

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niques. Each expert reviewed the existing guidelines and suggested changes that needed to be incorporated into the new guidelines. One principle followed in the composition of these guidelines was that they should be easily understandable by the general public. The final version of the manuscript was distributed among the members of the task force for final revision. The present is the product of the work of this task force.

Basic principles. *General concepts.* Neuroimaging constitutes a subspecialty of neurology. As such, it encompasses each and every discipline, modality, or technique that allows the acquisition of visual information (i.e., images) of neural structures or their physiologic characteristics. Very specific modalities are identified as being part of this broad field, each with its own technical background, clinical applications, limitations, and impact on the care of neurologic patients. The following is a summary of the principles of each.

Neurosonology. Neurosonology is a science based on the use of sonic energy for the study of the nervous system and related structures and in the diagnosis and treatment of neurologic conditions.

Computed tomography. CT is a science based on the utilization of instruments capable of generating images that display the density of living tissues. The images are acquired by means of narrow beams of x-rays that generate tomographic views of the tissue being examined.

Magnetic resonance imaging. MRI is a science based on the utilization of instruments capable of altering the magnetic characteristics of protons and of recording their behavior in response to such alterations. The instruments are essentially large magnets that generate very strong fields. Radiofrequency pulses are used to alter the orientation of protons within the tissues being examined. Magnetic coils are used both as transmitters and receivers capable of recording magnetic signals emitted by the tissues. These procedures yield images of tissue that are of exquisite detail and are capable of displaying pathologic processes of different types.

Cerebral catheterization and angiography. Cerebral catheterization and angiography is a discipline that involves the invasive study of the vessels that constitute the blood supply and drainage of the nervous system. In general, the techniques involve the percutaneous introduction of catheters into the arterial or venous systems, most commonly via the femoral approach, with selective or supraseductive catheterization of specific neurovascular structures under fluoroscopic guidance. This is followed by the injection of a contrast agent into the vessels concurrently with the acquisition of radiographic images.

Functional neuroimaging. This is the newest modality within the field of neuroimaging. Nevertheless, it is undergoing rapid expansion and a rela-

tively complex evolution. Several different techniques are commonly considered under the heading of functional neuroimaging, including single-photon emission computed tomography (SPECT), PET, and various functional MRI techniques. They all share the common characteristic of being able to image physiologic aspects of the nervous system, such as cerebral perfusion. PET and SPECT allow for the imaging of the regional concentration of some neurotransmitter receptors in the brain.

Requirements for performance and interpretation

General criteria

1. Completion of a neurology residency training program.
2. Holding a valid unrestricted medical license.

Specific criteria

1. Basic training in each specific neuroimaging modality
 - a. When the neurologist's residency or fellowship training program included verifiable training in the neuroimaging modality. No additional basic training is needed if the residency or fellowship program included formal training in the basic principles and clinical application of the neuroimaging modality. In particular, for CT, this applies to neurologists whose training in an approved neurology residency program took place after 1980. Regarding MRI, it applies to those trained after 1989. More specifically, the neurologist's training must have included, for each of the modalities that comprise neuroimaging, the following topics: physics, biologic effects and instrumentation, anatomy, pathology, pathophysiology, technique, indications, interpretation, and quality control. In addition, for PET and SPECT, knowledge of radiopharmaceuticals, tracer kinetics, and radiation dosimeter is also necessary.
 - b. When formal training was not included in the neurologist's residency or fellowship. In particular, for CT, this applies to neurologists trained before 1980 and, for MRI, to those trained before 1989. The neurologist should provide verification to the credentialing organization that he or she has completed a course(s) for a minimum number of hours covering the specific topics listed above. This training should be approved by the Accreditation Council for Continuing Medical Education (ACCME) for credit in category I of the AMA's Physician Recognition Award. The minimum number of hours required for training in each modality is the following:

Modality	Minimum hours
Neurosonology	40
CT	80
MRI	160
SPECT	100
PET	160

2. Practical experience in neuroimaging

- When the neurologist's residency or fellowship training program included verifiable training in neuroimaging. Documentation of the neurologist's involvement in the performance and/or interpretation of at least 100 studies (for each modality or technique) under the supervision of a qualified specialist.
- When formal neuroimaging training was not included in the neurologist's residency or fellowship. Documentation of the neurologist's interpretation of at least the following number of studies under supervision:

Modality	Minimum studies
Neurosonology	100
CT	150
MRI	250
SPECT	150
PET	250

In addition, a qualified specialist must endorse the quality of work of the neurologist.

3. Certification of qualifications

The neuroimaging fellowship programs approved and listed by the AAN and the American Society of Neuroimaging (ASN) fulfill basic and continuing competence requirements. The certification process of the ASN is one mechanism by which neurologists can demonstrate special expertise in the technical aspects and clinical applications of each of the modalities or techniques of neuroimaging.

4. Continuing competence

- After initial training, the neurologist who interprets and/or performs neuroimaging studies should participate annually in category I, ACCME-approved continuing medical education programs in the neuroimaging disciplines he or she practices. At least 25 hours every 5 years is recommended.
- The neurologist who interprets and/or performs neuroimaging studies must participate in an ongoing quality assurance or improvement program for the laboratory or facility to which he or she is associated.

5. Special requirements for cerebral catheterization and angiography

- Rationale for requirements. Because of the invasive nature of the procedure of cerebral catheterization and its inherent risk to the patient, more specific criteria for its performance and interpretation must be outlined. In principle, the AAN endorses the position of the American Board of Internal Medicine (ABIM) and the American College of Physician's policy on the documentation and verification of the clinician's competence to perform procedures³⁻⁵. According to this policy, two areas of documentation are identified:

- Cognitive skills. These include the understanding of the indications, contraindications, and potential complications of a procedure and the management of complications and interpretation of the results.
- Technical skills. These involve the proficient performance of the procedure and aspects related to the care of the patient before and after the procedure.

- Specific training criteria. The basic training to perform cerebral catheterization and angiography may be obtained as part of a residency or fellowship program, but this is not an absolute requirement. Nevertheless, any type of training must be undertaken under the tutelage of one or more qualified preceptors.

- Cognitive skills. These are most easily acquired during a residency or fellowship program that emphasizes the clinical care of patients whose evaluation and treatment commonly requires the performance of cerebral catheterization and angiography. This includes residency training in neurology and fellowships in vascular or critical care neurology.

- Technical skills. These criteria are required for the safe practice of cerebral catheterization and include the performance of a minimum of 100 procedures under the supervision of one or more qualified preceptors. The training must involve the development of a variety of individual skills that must be separately mastered and concurrently applied, including

Basic knowledge about working in sterile fields and environments;

Basic principles of percutaneous vascular access;

Basic knowledge of guidewire and catheter materials, types, uses, advantages and disadvantages, and their manipulation;

Basic working and safety knowledge of air-free (i.e., enclosed) endovascular systems;

Basic knowledge about principles of fluoroscopic and radiographic imaging and radiation safety;

Familiarity with the use of contrast agents, their characteristics, side effects, and contraindications for their use.

Requirements for independent operation of neuroimaging facilities

Specific criteria

1. CT imaging facilities

- a. When the neurologist's residency or fellowship program includes verifiable training in CT technique and interpretation. The neurologist should obtain additional training and experience in the management, operation, and performance of CT procedures and facilities. He or she should have at least 3 months of supervised CT facility management under the direction of a physician qualified by experience to direct such a facility.
- b. When formal CT training was not included in the neurologist's residency or fellowship program. The neurologist must participate in a 6-month fellowship (or equivalent) in CT to provide the experience cited above.

2. MRI facilities

- a. When the neurologist's residency or fellowship program includes verifiable training in MRI technique and interpretation. The neurologist should obtain additional training and experience in the management, operation, and performance of MRI procedures and facilities. He or she should have at least 6 months of supervised MRI facility management under the direction of a physician qualified by experience to direct such a facility.
- b. When formal MRI training was not included in the neurologist's residency or fellowship program. The neurologist must participate in a 1-year fellowship (or equivalent) in MRI to provide the experience cited above.

3. SPECT facilities

To operate a SPECT laboratory independently, the physician should be qualified by state and federal guidelines in the handling, preparation, and administration of radiopharmaceuticals. The neurologist should be able to fulfill all requirements for becoming a radiopharmaceutical-human-use investigator and provider.

- a. When SPECT training was included in the neurologist's residency or fellowship training. The neurologist must have at least 6 months of supervised laboratory management under the supervision of a physician qualified to direct such a facility.
- b. When SPECT training was not included in the neurologist's residency or fellowship training. The neurologist must participate in a 12-month fellowship (or equivalent) under the supervision of a physician qualified to direct such a facility.

4. PET facilities

To operate a PET laboratory independently, the physician should be qualified by state and federal guidelines in the handling, preparation, and administration of radiopharmaceuticals. The neurologist should be able to fulfill all requirements for becoming a radiopharmaceutical-human-use investigator and provider.

- a. When PET or SPECT training was included in the neurologist's residency or fellowship training. The neurologist must have at least 12 months of supervised laboratory management under the supervision of a physician qualified to direct such a facility.
- b. When SPECT training was not included in the neurologist's residency or fellowship training. The neurologist must participate in a 24-month fellowship (or equivalent) under the supervision of a physician qualified to direct such a facility.

Continuing competence. Regardless of what type of imaging facility the neurologist is operating, he or she must continue to participate in annual continuing medical education programs and in a meaningful quality assurance program.

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