

1998 World Federation of Interventional and Therapeutic Neuroradiology

Guidelines for Fellowship Training Programmes in Interventional Neuroradiology

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1. Definition and Objectives

Interventional neuroradiology (intravascular neurosurgery) is a clinical specialty that uses percutaneous and catheter technology, radiological imaging and clinical expertise to diagnose and treat diseases of head and neck, spine and the central nervous system. The unique clinical and invasive nature of this specialty requires special training and skills.

The interventional neuroradiologist must:

- 1) be familiar with the signs and symptoms of disorders amenable to diagnosis and treatment by neurointerventional techniques;
- 2) conduct thorough and accurate neurologic examinations to evaluate patients with neurological disorders;
- 3) understand the pathophysiology and natural history of these disorders;
- 4) know the indications and contraindications to neurointerventional procedures;
- 5) be skilled in the clinical and technical aspects of their implementation;
- 6) be familiar with other therapeutic alternatives;
- 7) have a thorough understanding of the pre and post operative management of patients;
- 8) have an appropriate understanding of neurointensive care management;
- 9) understand the fundamentals of radiation physics, radiation biology and radiation protection, and the basic sciences related to technical aspects of neurointerventions.

The objective of training in interventional neuroradiology is to provide trainees with an organized, comprehensive, supervised, fulltime educational experience in techniques of neurointerventional procedures, diagnostic neuroradiology, including the comprehensive clinical management of the diseases involved.

2. Duration of Training

The WFITN endorses a specially tailored residency training for future interventional neuroradiologists. This optimal residency programme for full training last six years and includes

- 1 year of basic diagnostic imaging
- 18 months of diagnostic neuroradiology
- 18 months of clinical neurosciences
- 2 years of interventional neuroradiology.

Specific training applies to the trainees who have completed either an accredited fellowship in neuroradiology, or an accredited residency in neurosurgery or equivalent training.

After validation of the background acquired in specific imaging or clinical training, the complementary training cannot last less than two years or more than three years.

* *Trainees with a background in neuroradiology* can complete the programme in two years if they enter the programme with at least 12 months of dedicated, elective training in the clinical aspects of patient assessment acquired in an accredited programme, or its equivalent. This experience must include training in treatment, planning and patient management, the fundamentals of invasive monitoring, neurointensive care management, the drugs commonly employed in conjunction with neuroendovascular procedures and the pathophysiology and natural history of the diseases to be treated.

* *Trainees with a background in neurosurgery* can complete the programme in two years if they enter the programme with at least 12 months of dedicated, elective training in neuroradiology acquired in an accredited programme or its equivalent. This experience must include training in image interpretation, basis of interventional techniques, use of angiographic devices and materials and radiation physics and protection.

3. Programme Director

The programme director must:

- 1) be certified by either the national Board of Neurosurgery, Radiology or Neuroradiology;
- 2) have special expertise in interventional neuroradiology and must concentrate at least 50% of his/her practice in interventional neuroradiology;
- 3) devote sufficient time to the programme to fulfil all of the responsibilities inherent in meeting its educational goals. It is mandatory that the programme director hold faculty positions in academic neurosurgical and/or radiological departments. The programme director is responsible for establishing the curriculum, selecting and supervising the trainees and selecting faculty members. The director of the interventional neuroradiology programme must be appointed and be responsible to the programme director of the sponsoring academic training programme.

4. Faculty

The programme faculty must include at least one additional full-time member with expertise in interventional neuroradiology, who is certi-

fied by either the national Board of Neurosurgery, Radiology or Neuroradiology, or possess equivalent qualifications. The faculty must provide supervision of trainees. The effectiveness of the faculty should be periodically evaluated by the programme director in consultation with trainees.

5. Faculty / Trainee Ratio

The total number of trainees in the programme must be commensurate with the capacity of the programme to offer an adequate educational experience in interventional neuroradiology.

6. Patient Population

The institution's patient population must have a diversity of illness from which a broad experience in interventional neuroradiology can be obtained. There must be an adequate variety and number of neuroendovascular procedures for each trainee. Each trainee must participate in a minimum of 80 interventional procedures per year. Each trainee must maintain a personal case log book which the programme director must certify at the completion of training.

7. Equipment and Facilities

Modern imaging/procedure rooms and equipment must be available and must permit the performance of all neurointerventional procedures.

The institutions where interventional neuroradiology training is conducted must include neurology, neuroradiology, neurosurgery as well as appropriate inpatient, outpatient, emergency and intensive care facilities.

8. Research Facilities

The institution should provide laboratory facilities to support research projects.

9. Educational Programme

9.1. Curriculum

The training programme must offer teaching and clinical experience that encompass the full clinical spectrum of interventional neuroradiology.

9.1.1. Preliminary Requirements

Before assuming primary responsibility for performing neuroradiological interventional procedures, trainees must acquire basic neurosurgical or neuroradiological skills, depending upon the trainees backgrounds.

- 1) the use of all available imaging modalities, delivery systems and embolic materials related to interventional neuroradiology;
- 2) the basic radiology sciences including radiation physics, radiation biology, radiation protection, and the pharmacology of imaging contrast agents;
- 3) the basic and clinical neurosciences, including neuroanatomy, neurobiology, pathophysiology and natural history of neurological disorders;
- 4) the clinical aspects of patient assessment, treatment options and patient management related to neurological diseases, including the fundamentals of neurointensive care management;
- 5) the proper use and interpretation of the laboratory tests used in interventional neuroradiology;
- 6) the clinical indications, risks and limitations of neurointerventional procedures;
- 7) the use and administration of drugs commonly employed in conjunction with neuroendovascular procedures.

Trainees who have acquired these skills during residency training and who have demonstrated competence in these areas can continue into the clinical neurointerventional phase of training at the discretion of the programme director.

9.1.2. Neurointerventional Clinical Training

The interventional neuroradiology trainees should have the opportunity to do all of the following under close supervision: perform clinical pre-procedure evaluation of patients; interpret preliminary diagnostic studies; consult with clinicians; perform diagnostic and therapeutic neurointerventional procedures; generate procedural reports.

The continuity of care must be of sufficient duration to assure that the trainee is familiar with the outcome of the neurointerventional procedure.

The trainee should serve as consultant under the supervision of faculty members.

Direct interactions of trainees with patients must be closely observed to assure that appropriate information, standards of care and concern for ethics and patient welfare are strictly maintained.

Communications, consultation and coordination of care must be maintained and documented with appropriate notes in the medical record.

9.2. Conferences and Training

There shall be intradepartmental conferences as well as conferences with related clinical departments in which trainees participate on a regular basis. There must be documented regular review of all mortality and morbidity related to the performance of neurointerventional procedures. Trainees must participate actively in this review. Trainees should be encouraged to attend and participate in local extramural conferences and should attend at least one national meeting or postgraduate course in interventional neuroradiology while in training.

10. Evaluation

The programme director, in consultation with the neurointerventional faculty must evaluate the competence and progress of each trainee. The evaluation must include an assessment of intellectual abilities, technical skills, attitudes and interpersonal relationships as well as decision-making skills and clinical management skills. These evaluations should be provided to and discussed with each trainee. At least annually, trainees must be given the opportunity to provide a written evaluation of the programme and the faculty.

11. Trainee Participation in Research

The educational environment should encourage trainees to undertake investigative study of either a clinical or basic sciences nature. Trainees may participate in research projects conducted by the faculty or other trainees or may undertake a project as principal investigators. They should learn the fundamentals of the experimental design, performance and interpretation of results. They should be encouraged to submit their work for presentation at national or international meetings and for publication in scientific journals.