Basic Standards for Fellowship Training in Neuroradiology, Pediatric Radiology, and Vascular and Interventional Radiology

American Osteopathic Association and American Osteopathic College of Radiology
Basic Standards for Fellowship Training in
Neuroradiology, Pediatric Radiology, and Vascular and Interventional Radiology

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BASIC STANDARDS FOR
FELLOWSHIP TRAINING IN NEURORADIOLOGY, PEDIATRIC RADIOLOGY, AND VASCULAR AND INTERVENTIONAL RADIOLOGY

I. Introduction

These are the Basic Standards for Fellowship Training in Neuroradiology, Pediatric Radiology, and Vascular and Interventional Radiology as established by the American Osteopathic College of Radiology (AOCR) and approved by the American Osteopathic Association (AOA). These standards are designed to provide the osteopathic fellow with advanced and concentrated training in the subspecialties of radiology and to prepare the fellow for examination for certification in the respective radiology fellowship by the American Osteopathic Board of Radiology (AOBR).

II. Mission

The mission of the osteopathic radiology fellowship training program is to provide fellows with comprehensive structured cognitive and clinical education that will enable them to become competent, proficient and professional osteopathic subspecialty trained radiologists.

III. Educational Program Goals

The goals of a diagnostic radiology fellowship training program are to achieve proficiency in the following core competencies:

A. Osteopathic Philosophy and Osteopathic Manipulative

3.1 The integration of osteopathic principles into the daily practice of the subspecialties of radiology.

B. Medical Knowledge

3.1 Demonstrate competency in the understanding and application of clinical medicine to patient care.

3.2 Know and apply the foundations of clinical medicine to the radiology subspecialty field.

3.3 Demonstrate a desire to continually improve his/her medical knowledge and that of others.

C. Patient Care

3.1 Demonstrate the ability as a consultant to help referring clinicians develop a management plan based on radiologic findings and other medical information.

3.2 Demonstrate an awareness of psychosocial issues and incorporate health promotion into clinical practice.

D. Interpersonal and Communication Skills

3.1 Demonstrate effective doctor-patient relationships.

3.2 Exhibit effective listening, written and oral communication skills in professional interactions with patients, families, and other healthcare professionals concerning imaging and procedure appropriateness, informed consent, safety issues, and the results of imaging tests or procedures. Competence in oral communication must be judged through direct observation. Competence in written communication must be judged on the basis of the quality and timeliness of dictated reports.
3.3 Understanding prioritization of reporting pertinent results to clinical staff and patients.
3.4 Understanding cultural, economic and intellectual/educational differences.

E. Professionalism
3.1 Demonstrate respect for patients and families and advocate for the primacy of patient’s welfare and autonomy.
3.2 Demonstrate compassion, integrity, and respect for others, responsiveness to patient needs, respect for patient privacy and autonomy, accountability to patients, society and the profession.
3.3 Adhere to ethical principles in the practice of medicine.
3.4 Compliance with institutional and departmental policies (e.g. HIPAA, the Joint Commission, patient safety, infection control).

F. Practice-Based Learning and Improvement
3.1 Treat patients based upon the most current medical knowledge on diagnostic and therapeutic effectiveness.
3.2 Perform self-evaluations of clinical practice patterns and practice-based improvement activities using a systematic methodology.
3.3 Understand research methods, medical informatics, and the application of technology as applied to radiology subspecialty field.

G. Systems-Based Practice
3.1 Understand national and local health care delivery systems and how they affect patient care and professional practice.
3.2 Advocate for quality health care on behalf of patients and assist them in their interactions with the complexities of the medical system.

IV. Institutional Requirements
A. Base Institution
4.1 Must have an AOA accredited diagnostic radiology residency program (with the exception of pediatric radiology at a Children’s Hospital). The accreditation status of the fellowship program will be directly related to that of the core diagnostic radiology program as follows: Fellowship program accreditation status will have no affect on the diagnostic radiology residency program. However, if the diagnostic radiology residency program is given a probationary status, the fellowship program will be notified that its accreditation status is also in jeopardy. Withdrawal of accreditation of the diagnostic radiology residency program will result in simultaneous withdrawal of accreditation of the fellowship program.
4.2 Must provide Program Director at least one-half day a week or equivalent protected time to fulfill the responsibilities inherent in meeting the educational goals of the program.

B. Department of Radiology Requirements
4.1 The department of radiology must have:
   a. A system of records for all procedures performed.
   b. A pathologic cross-indexed file that uses standard nomenclature.
4.2 Provide office space for fellows.

4.3 Library resources relevant to radiology and general medicine must be accessible from the radiology department 24 hours a day.

V. Program Requirements and Content

A. General Program Requirements

5.1 The fellowship program shall adhere to a minimum of one year curriculum.

5.2 This environment must include exposure to both the clinical applications of the subspecialty as well as the skills necessary to develop the proper attitudes towards patients, professional staff, and administration of the institution.

5.3 During the most recent 5-year period, at least 50% of the program’s graduates shall pass the certificate of added qualifications examination on the first attempt.

B. Didactic

5.1 Each area of training must have specified reading assignments.

5.2 Fellows must be excused from clinical duties to attend planned educational experiences.

5.3 Curriculum must also include:

   a. All clinical subspecialty areas and imaging modalities of the subspecialty.
   
   b. Advanced training in the basic sciences, which shall include didactic learning and clinical experiences (i.e., anatomy, physiology, drug interactions, allergic reactions, etc.).
   
   c. Monthly journal club.
   
   d. Tumor boards.
   
   e. Education in low dose radiation techniques for both adults and children, and learn and/or treat complications of contrast administration.
   
   f. Education in development of skills in preparing and presenting educational material for medical students, graduate medical staff, and allied health personnel;

      1. Specifically, fellows must be involved in teaching conferences for medical students, radiology residents, other residents rotating on specific fellowship service, and other health professional training programs.

C. Clinical Components

5.1 Clinical training must:

   a. Encompass instruction and experience in all aspects of imaging and interventional procedures commonly accepted in that subspecialty.
   
   b. Expand on the basic sciences and provide didactic instruction alongside clinical training and experiences in normal anatomy, physiology, and pathology of the major subspecialty areas (e.g., cardiac, including the coronary arteries).

5.2 Opportunities shall be provided for the fellow to follow patients to surgery and to correlate with pathology to develop an understanding of the gross pathology of surgical specimens.

5.3 Continuity of care during the fellowship shall be ensured by proper communication between shift changes and attending with physician(s).
5.4 Morning reviews of important, interesting and critical cases shall occur daily.

5.5 Fellows must maintain a record (logs) of all supervised examinations or interventional procedures in which they are involved. Examples of supervised interventional procedures include: image-guided biopsies, drainage procedures, percutaneous access techniques, non-coronary angioplasty, embolization and infusion techniques, etc. The fellow’s documentation will record the performance status (first assist vs. second assist), interpretation and complications of these invasive/interventional and vascular procedures.

5.6 Each fellow must have current certification in basic life support, and/or certification in advanced cardiac life support.

5.7 Each fellow must demonstrate an understanding of the administration and monitoring of conscious sedation.

D. Fellow Research

5.1 During their training, each fellow must participate in an investigative project under faculty supervision. Selecting from laboratory research, clinical research, or the retrospective analysis of data from patients.

5.2 The results of such projects shall be suitable for publication and presentation at local, regional, or national scientific meetings.

5.3 Administrative support should be provided for the conduct of research projects. Assistance with literature searches, editing, statistical tabulation and photography should be provided.

E. Fellowship Specific Training

Neuroradiology – Appendix I
Pediatric Radiology – Appendix II
Vascular and Interventional Radiology – Appendix III

VI. Faculty and Administration

A. Program Director

6.1 The program director of the fellowship program will be formally appointed and must possess the following qualifications:

a. Be certified as a radiologist by the AOA, through the AOBR and hold a certificate of added qualification in the subspecialty of the training program.

b. Be a full-time radiologist, capable and interested in conducting a program in the subspecialty area and must practice a minimum of 70% in the subspecialty.

c. Involvement in research and academic pursuits.

6.2 The program director shall have the following responsibilities:

a. Preparation of a Fellowship Program Manual outlining 1) the curriculum, 2) the educational goals and objectives of the program with respect to knowledge, skills, and other attributes of fellows for each major rotation or other program assignment, and 3) the skills and competencies the fellow will be able to demonstrate at the conclusion of the program.
1. Update annually the Manual, to include the skills and integration of the AOA competencies, and distribute to each fellow and faculty, in either written or electronic form.


3. The Manual shall be readily available for review.

b. Must establish an attendance policy for all scheduled conferences and maintain a record of attendance for all lectures, journal club, etc.

c. Develop an explicit written description of supervisory lines of responsibility for the care of patients to include the performance of radiologic procedures.

1. This policy will also describe the process which documents direct supervision to indirect supervision.

2. Such guidelines must be communicated to all members of the program faculty.

3. Fellows must be provided with prompt, reliable systems for communication and interaction with supervisory physicians.

4. A faculty radiologist must be available at all times for consultation with the fellow.

d. Notifies the AOCR of all fellow enrolled in the training program on an annual basis.

e. Ensure that the AOA, OPTI and AOCR are informed immediately of major changes in the program, including but not limited to, changes in program directors, institutional ownership and affiliation, radiology department staff or other major administrative changes.

f. Attend program directors meetings (on site or conference call) as required by the AOCR to facilitate Program Director and Faculty development activities.

g. Review the fellow’s log at least monthly and provide feedback to the fellow at least quarterly.

B. Faculty

6.1 To be considered for approval of a fellowship training program the department must have a minimum of two (2) full-time faculty appointed to the fellowship program and practicing at the base institution. There must be a minimum of one (1) faculty member for every two (2) fellow positions to provide adequate supervision of fellows. Part time faculty will be counted based upon the percentage of time of active participation in the teaching program. Locum tenens radiologists cannot qualify as faculty members.

6.2 At least 50% of the physician faculty must have the appropriate subspecialty certification by the AOB or the ABR. Each faculty member must:

a. Maintain current certification by the AOB or the ABR.

b. Possess current medical licensure and staff appointment.

c. Be provided with non-clinical time to devote to the educational program to fulfill their supervisory and teaching responsibilities and to demonstrate a strong interest and commitment in the education of fellows.

d. Devote time teaching and supervising fellows to assure that the curriculum is implemented.
1. Provide a minimum of one formal educational activity per month, averaged over a year. A formal educational activity may include but is not limited to conducting a journal club, tumor boards, imaging case conference, multi-specialty conference, educational media presentation or providing a formal didactic lecture.

2. Participate in viewbox or reading station teaching.

3. Provide training in research techniques and provide guidance and technical support to fellows when engaged in research activity.

   e. Be organized and have regular documented meetings to review the goals and objectives as well as program effectiveness in achieving them. At least one fellow representative will participate in these reviews.

   f. Provide timely evaluations and effective feedback to fellows on their performance.

   g. Supervise the fellow in their daily duties in accordance with the program’s supervision policy.

      1. All radiologic examinations must be reviewed and the fellow’s dictation shall be checked and approved by an attending radiologist.

   h. Be on call with the fellow and must assume responsibility for all actions of the fellow(s) under his/her supervision.

      1. Specific responsibilities shall be delegated to the fellow at the discretion of the institution and/or department supervisory plan.

C. Other Personnel

6.1 The institution shall have designated administrative and other non-physician staff committed to the program to support teaching in the fellowship program.

VII. Fellow Requirements

A. An applicant for fellowship training must:

7.1 Have successfully completed an AOA-approved diagnostic radiology preliminary year.

7.2 Have successfully completed an AOA-approved diagnostic radiology residency.

B. Fellow Responsibilities

7.1 Must be a full-time trainee of the training institution and must not be a trainee in any other training program at the same time.

7.2 The fellow is legally, morally, and ethically responsible to pursue exclusively the agreed upon program of training.

7.3 May not act as an unsupervised consultant in activities deemed as part of the current educational program/curriculum and must be designated in such a manner to retain his/her identity as a fellow (e.g., name tag, signature block, etc.).

7.4 Shall maintain formal records (logs) of all activities related to the educational program (examinations interpreted and procedures performed).

   a. These records shall be submitted monthly to the program director and DME for review and verification.

7.5 Fellows are required to contribute to the teaching file in format and frequency as defined by
Be responsible to participate in education activities and opportunities that address ethical behavior as formulated by the program, especially the ethical dimensions of the practice of medicine.

Submit an annual report to the AOCR and the DME. An annual or final report must be evaluated as a twelve (12)-month period of fellowship training that must be under contract with a single institution.

Participate in subspecialty related and other conferences including journal club. Conferences must provide for progressive fellow participation.

Must complete all AOCR requirements as well as any additional requirements of the individual fellowship training program or the OPTI each year prior to AOCR approval for that year of training.

C. Duty Hours

In addition to AOA duty hour policy:

a. When fellows perform teleradiology from home, time spent performing teleradiology must be counted toward the weekly duty hour limit.

b. At home teleradiology assignment or in-house call shall not be more often than every third night averaged over any consecutive four-week period.

D. Number of Fellows

The number of fellows must not have a negative impact on the core diagnostic radiology program.

VIII. Evaluation

The program must demonstrate an effective plan for continuous improvement of fellow performance and competency utilizing regular assessments of the fellows, faculty and the program.

A. Fellow Evaluations

The program must:

a. Use multiple evaluators (e.g., faculty, peers, patients, self, and other-professional staff)

b. Provide semiannual evaluations to include a review of procedural competencies or other simulation learning.

Quarterly Evaluation

Evaluate more frequently if a fellow’s performance is substandard.

Final Evaluation

A final evaluation will be completed per AOA Basic Documents for Postdoctoral Training requirements and must attest to the fellow’s professional abilities and competency at graduation to independently practice in the subspecialty.

b. A copy must be sent to the AOCR office and the program’s OPTI.

B. Faculty Evaluation
8.1 The program director and program faculty shall be peer evaluated at least annually for their teaching, scholarly activities, and development of the program.

8.2 At the end of each rotation the fellow’s evaluation of the faculty

C. Program Evaluation

8.1 There will be a program evaluation committee consisting of the program director, one faculty member and the chief fellow to prepare an evaluation of the program at least annually and perform a report as a method for revision and updating of the program.

8.2 Program assessments and measured outcomes for continuous quality improvement shall be done on an ongoing basis, with an annual summative evaluation of the quality of the program.

a. This information shall be used for program improvement activities.

b. Documentation of this performance improvement shall be maintained on file and available for program reviews.

8.3 Multiple measures shall be used for program review and evaluation to obtain a comprehensive view of program quality.
APPENDIX I

NEURORADIOLOGY

The program must provide fellows with an organized, comprehensive, and supervised full-time educational experience in the selection, interpretation, and performance of neuroradiologic examinations and procedures.

9.1 The fellowship program in neuroradiology must provide a volume and variety of patients with neurological, neurosurgical, ophthalmologic, otorhinolaryngologic, spinal, and other pertinent disorders so that fellows gain competency in the full range of neuroradiologic examinations, procedures, and interpretations. Each trainee must participate in a minimum of:

a. CT - Minimum 1,500 examinations
b. MRI - Minimum 1,500 examinations to include such as magnetic resonance spectroscopy (MRS), functional activation studies (MRI), diffusion weighted imaging (DWI), diffusion tensor imaging (DTI) and perfusion imaging (CTP and MRP) should be incorporated into the training program.
c. Image Guided - Minimum 50 invasive procedures to include angiography (diagnostic and therapeutic) of the cranial cavity, neck and spine, image guided access to the spinal subarachnoid space for the purposes of myelography, CSF analysis and/or instillation of therapeutic agents, image guided biopsies of the spine, skull, and neck, spine procedures including vertebroplasty, kyphoplasty, discography epidural injections, and nerve blocks, and performance of relevant patient evaluation, patient management skills and relevant pharmacology.
d. Angiography - Minimum 50 catheter-based procedures, participation in at least five (5) intracranial microcatheter procedures should be included.
e. Non-Invasive (CT and/or MR) Angiograms – 250

9.2 The general educational content of the program shall include didactic courses of study that emphasize the methods and techniques of neuroradiology procedures as they relate to:

a. Anatomy and pathology of the nervous system.
b. Physiology and pathophysiology of the nervous system
c. Pharmacology of contrast agents and drugs
d. Radiation physics and equipment design
e. Radiation safety precautions

9.3 The 12 month training program must comprise a minimum of:

a. 4 weeks or equivalent of dedicated training in pediatric neuroradiology.
b. 4 weeks or equivalent of dedicated training in head and neck radiology.
c. 4 weeks or equivalent of training in spine radiology including non-invasive studies and image-guided procedures such as access to the spinal canal for myelography and medication installation, biopsy, discography, and therapeutic spine procedures.
d. 6 weeks or equivalent of training in vascular neuroradiology. (The program must offer
the opportunity for fellows to perform and interpret non-invasive and invasive
diagnostic catheter-based cervicocerebral angiography. During this period there should
be a special emphasis on catheter-based selective cervicocerebral angiography.
Experience in microcatheter techniques for thrombolysis treatment of acute stroke and
endovascular treatment of aneurysms is strongly recommended.).

e. The remainder of the time should be spent in general (adult) neuroradiology. During this
time there should be an experience in new and evolving techniques such as Perfusion
imaging, MR spectroscopy, Diffusion imaging, Diffusion Tension Imaging, MRI, and
PET.

9.4 Fellows must:

a. learn the fundamentals of pathology, pathophysiology, and clinical manifestations of the
brain, spine and spinal cord, head, neck, and organs of special sense.

b. must have advanced cardiac life support training and certification.
APPENDIX-II

PEdiatric radiology

A Pediatric Radiology fellowship must provide education in multimodality imaging of pediatric patients and include learning the unique knowledge, techniques, communications and interpersonal skills to meet the needs of infants, children, adolescents and young adults with both acute and chronic conditions. At the completion of the fellowship year, the fellow can be expected to apply his or her knowledge to appropriately image both the common and rare pediatric diseases in a safe environment directed to the special needs of those served. Pediatric radiologists function as expert diagnosticians, consultants, and clinicians.

10.1 The institution's pediatric population must include patients with diversity of pediatric illnesses from which broad experience can be gained.

10.2 The program must provide a minimum of 7,000 pediatric radiologic examinations per year per trainee to include at least:
   a. 300 fluoroscopic procedures,
   b. 300 ultrasound examinations
   c. 200 body imaging (CT/MR) examinations

10.3 The number of radiologic examinations available for the pediatric radiology trainee must not be unduly diluted by the presence and rotation of diagnostic radiology residents and/or other trainees.

10.4 Didactic schedule must emphasize the choice, methods and techniques of pediatric radiological studies and procedures as they relate to:
   b. Pathophysiology of organ systems.
   c. General physics, radiobiology, and instrument design.
   d. Medical aspects of related pediatric disciplines.
   e. Treatment of adverse reactions and complications.
   f. Pharmacology of sedation medications and protocols.
   g. Pediatric Advance Life Support (PALS) certification.

10.5 Clinical
   a. The pediatric radiology program shall provide rotations in chest, body imaging, GI/GU imaging, emergency call, ultrasound, musculoskeletal, nuclear medicine, fluoroscopy, vascular/interventional, neuroradiology, cardiology and fetal imaging. Rotations may have different lengths and designated rotations should be designed by the program director with the faculty.
   b. Fellows must learn techniques that improve understanding of age appropriate behaviors for the pediatric patient and sensitivity to the needs of parents and patients.
APPENDIX-III

VASCULAR AND INTERVENTIONAL RADIOLOGY

11.1 The trainee shall participate in a minimum of 500 procedures.

11.2 Didactic schedule must emphasize the choice, methods and techniques of angiographic and interventional radiological procedures as they relate to:

a. Anatomy of the organ systems.

b. Physiology of human structure.

c. Pharmacology of contrast agents and drugs.

d. Pathophysiology of organ systems.

e. Radiation physics and radiation biology.

f. General physics and equipment design.

g. Radiation safety precautions.

h. Treatment of adverse reactions and complications.

i. Advanced cardiac life support certification.

11.3 Training must also:

a. provide instruction in the use of needles, catheters and guide wires as well as provide an understanding of the physical properties and physiologic responses of all short and long term implantable devices as they pertain to interventional radiology.

b. provide instruction in the clinical aspects of patient assessment, patient management, clinical indications, risks, and limitations of vascular and interventional procedures.

c. provide understanding of physiologic monitoring devices, their interpretations as well as proper interpretation of non-invasive tests as they pertain to vascular and interventional radiology.

d. include vascular procedures to include but not limited to: arteriography, venography, lymphography, angioplasty, vascular stenting, percutaneous revascularization procedures, embolotherapy, transcatheter infusion therapy, intravascular foreign body removal, and percutaneous placement of endovascular prostheses such as stent grafts and inferior vena cava filters and insertion of vascular access catheters

e. include nonvascular procedures to include but not limited to: percutaneous imaging-guided biopsy; percutaneous gastrostomy; percutaneous nephrostomy; ureteral stenting and other transcatheter genitourinary procedures for diagnosis and for treatment of lithiasis, obstruction, and fistula; percutaneous transhepatic and transcholecystic biliary procedures; percutaneous drainage for diagnosis and treatment of infections and other fluid collections; and percutaneous imaging-guided procedures such as ablation of neoplasms and cysts.

f. include specific clinical time dedicated to the performance and interpretation of vascular ultrasound studies, magnetic resonance angiograms, and CT angiograms