The Arab League
Council of Arab Health Ministers
The Arab Board of Health Specializations
General Secretariat

جامعة الدول العربية
مجلس وزراء الصحة العرب
المجلس العربي للاختصاصات الصحية
الأمانة العامة

المجلس العلمي للأشعة والتصوير الطبي

Scientific Council of Radiology and Medical Imaging

دليل اختصاص الأشعة التداخلية

Guidebook of Vascular & Interventional Radiology

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Introduction:

This curriculum outlines the training requirements for specialist fellowship training in Vascular & Interventional Radiology (VIR)

Vascular & Interventional Radiology can be broadly defined as the therapeutic and diagnostic subspecialty that comprises a wide range of minimally invasive image-guided therapeutic procedures as well as invasive diagnostic imaging. The range of diseases and organs amenable to image-guided therapeutic and diagnostic procedures are extensive and constantly evolving, and include, but are not limited to, diseases and elements of the vascular, gastrointestinal, hepatobiliary, genitourinary, pulmonary, musculoskeletal, and the central nervous system.

The goals of subspecialty training in vascular & interventional radiology are to provide the trainee with the opportunity to develop expertise in the following areas:

1. Medical expertise in VIR:
    a. Clinical evaluation and management of patients suitable for the image-guided interventions included in the scope of VIR practice.
    b. Diagnostic imaging and radiation safety pertinent to the subspecialty.
    c. Image-guided minimally invasive procedures and techniques as applied to multiple diseases and organs.
    d. Continual invention and innovation of new techniques, devices, and procedures.
2. Professionalism:
    a. In communication with VIR patients and their families
    b. In communication and collaboration with other surgical and medical services.
    c. In communication and collaboration with support staff in VIR units.
3. Health advocacy and leadership:
    a. Participate in patients and clinical staff education in regards to VIR procedures and clinical care.
    b. Actively participate in quality improvement projects
    c. Actively participate in strategic planning for the health system in matters related to policy making, staffing, billing and financing.
4. Research:
    a. Develop critical appraisal skills to enable the trainee analyzing and implementing the existing literature to VIR practice.
    b. Actively participate in ongoing research activities

The goals are achieved through:

- Knowledge of the relevant embryological, anatomical, pathophysiological and clinical aspects of diseases related to vascular & interventional radiology.
- Clinical knowledge relevant to medical and surgical management of diseases related to vascular & interventional radiology such that the trainee may confidently discuss the appropriate imaging strategy for the clinical problem with the referring clinician
- In-depth knowledge of the indications, contra-indications, complications and limitations of vascular & interventional procedures compared to other surgical and medical interventions.
- In-depth understanding of the technical aspects related to procedures performed by vascular & interventional radiology.
- Detailed knowledge of current clinical and technical developments in the specialty

- Understanding of the value of a multidisciplinary approach to diagnosis and management of diseases treated by vascular & interventional procedures, such as interventional oncology, peripheral arterial disease and dialysis access.
- Direct practical exposure with appropriate graded supervision in all forms of vascular and non-vascular interventions.

Competence in the clinical evaluation, selection, procedural performance and clinical follow up of patients treated in vascular 7 interventional radiology.

Requirements of Institute of Training & Required Personnel

The training center/s should be approved for training by the Arab Board

- A " Fellowship Director" must be identified/appointed by the training institution. S/he must be a consultant radiologist with appropriate expertise in vascular 7 interventional radiology and with appropriate academic background
- Trainers: The Department of Radiology should have at least two full-time certified and experienced Interventional Radiologists. In the event of a joint program the total number of Interventional Radiologists at the concerned institutions may be taken into consideration.
- Other hospital staff members: non-radiologist staff members who are selected by the director for their experience in areas relevant to interventional radiology practice, teaching skills, and/or academic interest. These may include staff in vascular surgery, hepatobiliary surgery, oncology, urology, and gastroenterology. All teaching staff should have experience in education, postgraduate training and research as evidenced by publications in peer-review journals.

<u>Facilities</u>

The institution and the program must jointly ensure the availability of adequate resources for fellow education, as defined in the specialty program requirements.

1) The program must provide adequate space, necessary equipment, and modern facilities to ensure an effective educational experience for fellows in all of the subspecialty rotations.
    a. There should be adequate personal or shared office space, conference space, and access to computers.
    b. Modern imaging equipment and procedure rooms must be available with adequate space to permit the performance of all radiological and interventional procedures, including vascular and non-vascular invasive imaging and image-guided interventional radiological procedures broadly distributed over the domain of interventional radiology.
    c. Imaging modalities must include fluoroscopy, digital subtraction angiography, CT, ultrasonography, and preferably MRI and radionuclide scintigraphy. Fluoroscopic and digital imaging equipment should be high resolution and have digital display with post-procedure image processing capability.
    d. Rooms in which interventional procedures are performed must be equipped with physiologic monitoring and resuscitative equipment.
    e. There should be facilities for storing catheters, guide wires, contrast materials, embolic agents, and other supplies adjacent to or within procedure rooms.
    f. Patient recovery and holding areas must be available.

g. There must be space and facilities for image display, image interpretation, and consultation with other clinicians.
h. An interventional radiology clinic or outpatient office, separate from the procedure rooms, must be available for patient consultations and non-procedural follow-up visits This space should be conducive to patient privacy and conducting physical examinations.

2) Patient population:
    a. The program must ensure a sufficient volume and variety of pediatric and adult patients for fellows to gain experience in the full spectrum of radiological and interventional radiological examinations, procedures, interpretations, outpatient clinic visits, and inpatient consultations.
    b. The program must have at least 1,000 interventions per year per fellow.
    c. The patient population must provide a diversity of illnesses from which a broad experience in interventional radiology can be obtained. This must include patients with arterial diseases, cancer, gastrointestinal diseases, gynecologic disorders, hepatobiliary diseases, endocrine diseases, musculoskeletal diseases, pulmonary diseases, venous diseases, and urologic disorders.

3) Support Services:
    a. Pathology and medical laboratory services must be regularly and conveniently available to meet the needs of patients.
    b. Diagnostic laboratories for the non-invasive assessment of peripheral vascular disease must be available.
    c. The sponsoring institution and program should provide laboratory and ancillary facilities to support research projects.

<u>Eligibility criteria for Training</u>

The applicant

- Must have successfully completed The Arab Board of Radiology & Medical Imaging. (Eligibility of graduates from other training schemes will be re-evaluated in two years after the start of the subspecialty programme)
- Is licensed to practice medicine in the country/ies of training
- Must have completed one year of radiology practice
- Provides written permission from the sponsoring body allowing him/her to undertake full time training for the full two year programme
- Provides two letters of recommendation from the institute where he last worked
- Registers as a trainee with the Arab Board for Health Specialties

Application for Certification in Vascular & Interventional Radiology Programme in Radiology & Medical Imaging:

- All applications must be completed online, and all supporting documentation must be uploaded through the online application system where requested
- Fees paid

Timetable for Training:

- The length of the programme is two years.
- Training guidelines and the curriculum are specified below

a) Educational Programme

i) The curriculum must contain the following educational components:

(1) Overall educational goals for the programme, which the programme must make available to fellows and faculty.

(2) Competency-based goals and objectives for each assignment at each educational level, which the programme must distribute to fellows and faculty at least annually, in either written or electronic form.

(3) Regularly scheduled didactic sessions.

(a) The core didactic curriculum must be documented.

(b) The core didactic curriculum must include the following core content areas of interventional radiology:

(i) Focused history and physical examination; (Core)

(ii) Health care team coordination; (Core)

(iii) Informed consent for interventional radiology procedures; (Core)

(iv) Inpatient care; (Core)

(v) Interventional radiology clinic; (Core)

(vi) Medical conditions relevant to interventional radiology procedures; (Core)

(vii) Pharmacology relevant to interventional radiology; (Core)

(viii) Procedural sedation for interventional radiology procedures. (Core)

(ix) Recognition and initial management of intra- and peri-procedural emergencies. (Core)

(x) Radiation safety (Core)

(xi) System specific topics:

1. Vascular access
2. Arterial interventions
   a. Peripheral vascular disease
   b. Aortic interventions
3. Venous interventions
   a. Deep venous thrombosis management
   b. Pulmonary embolism management
   c. IVC filters
   d. Central venoplasty
   e. Varicose veins management
   f. Venous malformations
   g. Venous sampling
   h. Lymphatic interventions
4. Portal hypertension:
   a. Management of variceal bleeding
   b. TIPSS
   c. Techniques for retrograde venous obliterations
5. Interventional oncology
   a. Tumor ablation
   b. Transarterial therapies
6. Hepatobiliary interventions
7. Gastrointestinal interventions
8. Genitourinary interventions
9. Percutaneous biopsies
10. Percutaneous drainage
11. MSK interventions
12. Neurointerventions

(xii) Technique and tool specific topics:

1. Vascular access and closure devices
2. Diagnostic and guiding catheters/wires
3. Stents
4. Embolic agents
5. Ablation devices
6. Thrombectomy devices/thrombolysis catheters
7. Atherectomy devices
8. Endovascular retrieval tools
9. Biopsy tools
10. Drainage catheters

(xiii) Research related topics
1. Critical appraisal
2. Data collection
3. Manuscript writing
4. Research ethics
5. Study designs
6. Reference managers
7. Presentation skills

(xiv) Economic related topics
1. Policy making, staffing, billing and financing in VIR

(c) The didactic curriculum should include interactive conferences in addition to the core didactic series. (Detail)

(d) The didactic curriculum should include interdepartmental conferences in which both fellows and faculty members participate on a regular basis. (Detail)

(e) Didactic conferences must be fellow-level-specific, and must provide formal review of the topics in the curriculum. (Core)

(f) Fellows must participate in scheduled conferences on a regular basis. (Core)

(i) Fellows must be provided protected time to attend lectures and conferences scheduled by the program. (Core)

(ii) The programme must provide mechanisms for fellows to participate in all scheduled lectures and conferences either in-person or by electronic means. (Core)

(iii) Fellows' attendance at conferences/lectures should be documented throughout the duration of their training. (Detail)

(iv) Fellows' teaching experience should include active participation in educating diagnostic radiology fellows, and if appropriate, medical students and other professional personnel in the care and management of patients. (Detail)

(g) Interventional radiology quality improvement:

(i) Morbidity and mortality related to the performance of interventional procedures must be reviewed at least monthly and be documented. (Core)

(ii) Fellows must actively participate in this review. (Core)

(iii) Fellows should participate in local or national vascular and interventional radiology societies. (Detail)

(iv) Fellows should prepare and present clinically- or pathologically-proven cases at departmental conferences. (Outcome)

(4) Regular participation in interdepartmental multidisciplinary meetings such as

(a) Tumor boards

(b) Vascular access meeting

(c) Peripheral vascular diseases meetings

b) Training format and rotations

i) The fellow must complete a minimum of 1000 interventions during the two year program

(1) The fellow must complete and document 500 vascular interventions according to the table below

(2) The fellow must complete and document 500 non-vascular interventions according to the table below

ii) The fellow must complete and document 100 diagnostic vascular imaging studies according to the table below

iii) The training program director should rotate the fellows to ensure adequate exposure to variety of cases throughout the training

iv) The training structure should be according to the following general outline:

	Vascular	Non-vascular	Clinical	Vacation	Elective
F1	4	5	1	1	1
F2	6	3	1	1	1

(1) Clinical rotations includes specific time dedicated for outpatient clinics and inpatient consultation

(a) The time for this clinical rotation during the first year may be spread throughout the entire year. The programme director has to attest for the successful completion of this requirement.

(b) Clinical rotation during the second year must be spent in block in either ICU/ER/vascular surgery

(c) Elective rotations are preferably spent in MSK/neurointerventions or can be dedicated for research projects

Procedures and clinical skills		Requirements	Procedures	
Diagnostics		Minimum of 100 cases	CT angio, MR angio, arterial and venous Doppler, ankle brachial index, segmental arterial pressures	
Adults interventions 95% Pediatric interventions 5%	Vascular interventions F1: 40% F2: 60%	Minimum of 500 procedures performed collectively	• Diagnostic angiography (lower/upper limb, visceral, pulmonary & cerebral angiography)	100 cases
			• Venous access: Totally Implantable Venous Access Devices: TIVADs or chest/arm ports, tunneled dialysis catheters, peripherally inserted central catheters (PICC), Hickman lines	150 cases
			• Inferior vena cava filter insertion and retrieval (retrievable & permanent)	20 cases
			• Angioplasty and stenting (aortoiliac, peripheral, visceral, venous)	50 cases

			• AV fistula/graft surveillance and intervention: diagnostic fistulogram, thrombolysis, thrombectomy and angioplasty	25 cases
			• Embolotherapy: aneurysms, traumatic hemorrhage (solid organ injury, pelvic, muscular, etc.), spontaneous bleeding, non variceal and variceal gastrointestinal bleeding, pre-operative (renal cell carcinoma, bone metastases), gonadal veins (varicoceles, pelvic congestion), AVM, epistaxis, bronchial artery embolization for hemoptysis	50 cases
			• Portal hypertension interventions: Transjugular Intrahepatic Portosystemic Shunts (TIPSS) placement, revision and gastroesophageal varices embolization	20 cases
			• Prostate and uterine artery embolization, including uterine fibroid embolization, post partum hemorrhage and prophylactic internal iliac artery occlusion balloons	10 cases
			• Pharmacological, mechanical and pharmacomechanical thrombolysis: arterial and venous including (PE) and lower limb veins (DVT)	10 cases
			• Transvenous biopsy / transjugular liver biopsy	5 cases
			• Varicose veins interventions: sclerotherapy, glue, Laser, Radiofrequency ablation	10 cases
			• Foreign body retrieval	5 cases
			• Interventional oncology interventions: Trans Arterial Chemo Embolization (TACE), Trans Arterial Embolization (TAE), Trans Arterial Radio Embolization (TARE), Hepatic artery mapping	25 cases
			• Venous sampling: Adrenal Venous Sampling (AVS), renal vein sampling, parathyroid venous sampling, petrosal venous sampling, calcium stimulation test	2 cases

			• Transplant interventions: liver and kidney transplant interventions	10 case
			• Aortic interventions: Endovascular Abdominal Aortic Aneurysm Repair (EVAR), Thoracic Endovascular Aortic Repair.	8 cases
	Non Vascular interventions F1: 60% F2: 40%	Minimum of 500 procedures performed collectively	Genitourinary interventions: Percutaneous Nephrostomy (PCN), Percutaneous Nephrolithotripsy (PCNL), Antegrade ureteric stenting (double J or nephroureteral stenting), brush biopsies, ureteroplasty, renal cysts aspiration and ablation	50 cases
			• Hepatobiliary interventions: Percutaneous Transhepatic Cholangiography (PTC), biliary drains and endoprosthesis insertion (external & internal stents + metallic stent), transductal biopsy using brush and forceps, gallbladder interventional procedures (cholecystostomy)	50 cases
			• Paracenthesis and thoracenthesis	75 cases
			• Gastrointestinal interventions: percutaneous feeding tubes (gastrostomy, gastrojejunostomy, primary jejunostomy & cecostomy), GI tract stenting (esophageal, gastric, duodenal, colorectal)	50 cases
			• Percutaneous abscess drainage from (trans-abdominal, trans-vaginal, trans-rectal and trans-gluteal routes)	100 cases
			• Percutaneous biopsies under fluoroscopic, ultrasound and CT guidance	100 cases
			• Spine interventions: percutaneous vertebroplasty and kyphoplasty, disc and vertebral biopsy	15 cases
			• Tumor ablation in liver, bone, renal and lung	30 cases
			• MSK interventions: biopsies, joint and tendon injections, joint aspiration, drainage, pain management, ablation	30

Methods of evaluation of Trainees:

1. On-going evaluation: (under the supervision of the Fellowship Director)
    - Clinical and technical performance skills assessment by the training personnel (monthly).
    - Clinical knowledge and technical skills assessment using case reviews (monthly).
    - The trainee's professionalism, attitude to work, team work, responsibility and adherence to ethical principles in medical practice will be included in the assessment
    - Logbook

2. Final evaluation of proficiency in interpretation (Arab Board subspecialty certification examination):
    - Individual consultants should provide written evaluation of trainees who have completed formal rotations in vascular interventional radiology. The evaluations will be collected and endorsed by the Fellowship Director
    - After finishing training, the trainee should pass the exit examination
    - Evaluation forms required for a continuous medical education (CME) activity filled out by the trainee upon course completion

Methods of Upgrading Knowledge/CME:

- During the training course, trainees are required to perform self-studies of selected textbooks and papers, and participate in weekly discussions with faculty of current cases.
- Trainees are expected to participate in research and audit.
- The trainee is expected to present 10 full case conferences/lectures during each year of training. S/he is required to demonstrate ability to instruct and teach junior colleagues and medical students
- The trainee is expected to be cognizant of radiation protection guidelines and practice

Examination Process:

- The examination is held once a year in October
- The format of the exam: Two hour oral examination by a panel of experts
- The candidate is allowed three chances at passing the exam
- The candidate is eligible to sit for the examination at the end of the training period. The application to sit the exam must be signed by the training institution with authenticated certificates of training and final evaluation

Leave / Vacation:

- The trainee is entitled to three weeks of annual leave per year
- One week of educational leave is available per year to attend courses/scientific meetings

List of References/Resources for Vascular & Interventional Radiology:

TEXT BOOKS

- Image-Guided Interventions, Mauro, Murphy, Thomson, Venbrux, Zollikofer
- Vascular And Interventional Radiology, Karim Valji
- Handbook of Interventional Radiology procedures, Krishna Kandarpa
- Interventional Radiology Survival guide, David Kessel, Lain Robertson

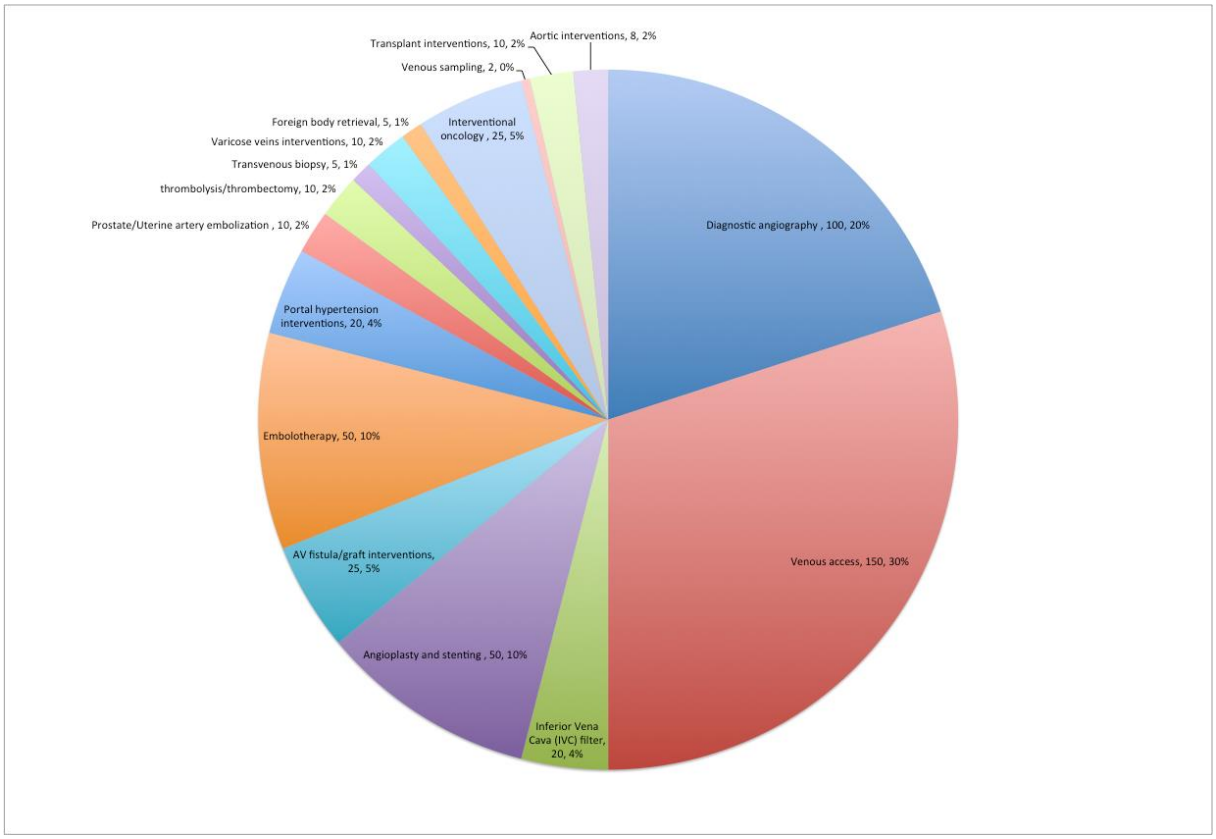
- ABRAMS, Angiography Interventional Radiology, Jean-Francois H. Geschwind. Michael D. Dake
- The Requisites Vascular & Interventional Radiology, John A. Kaufman, Michael J. Lee.
- Atlas of vascular anatomy an angiographic approach, Renan Uflacker

JOURNALS

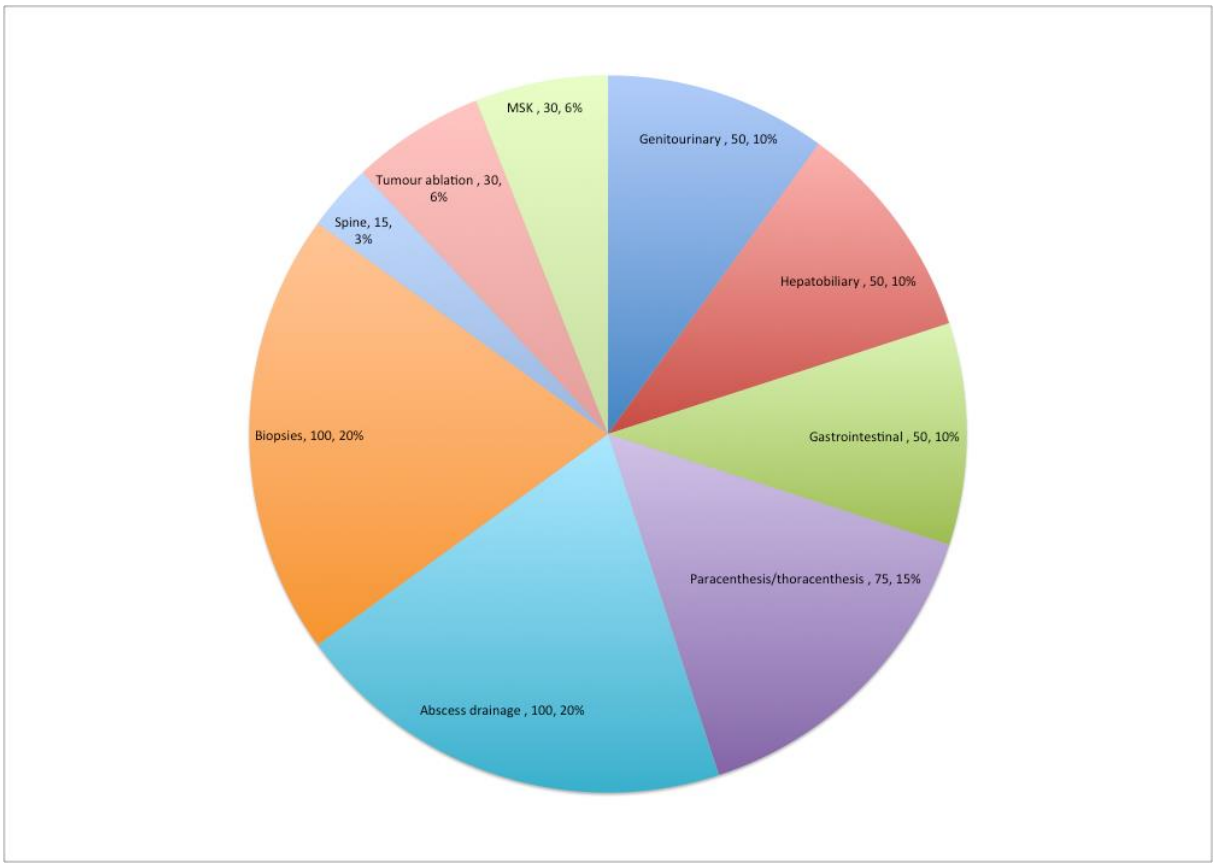
- The Journal of Vascular Interventional Radiology (JVIR)
- Radiology
- American Journal of Roentgenology
- The Arab Journal of Interventional Radiology (AJIR)
- Radiographics
- Cardiovascular Interventional Radiology (CVIR)
- European Radiology

Qualification Degree: Arab Board Fellowship in Vascular & Interventional Radiology

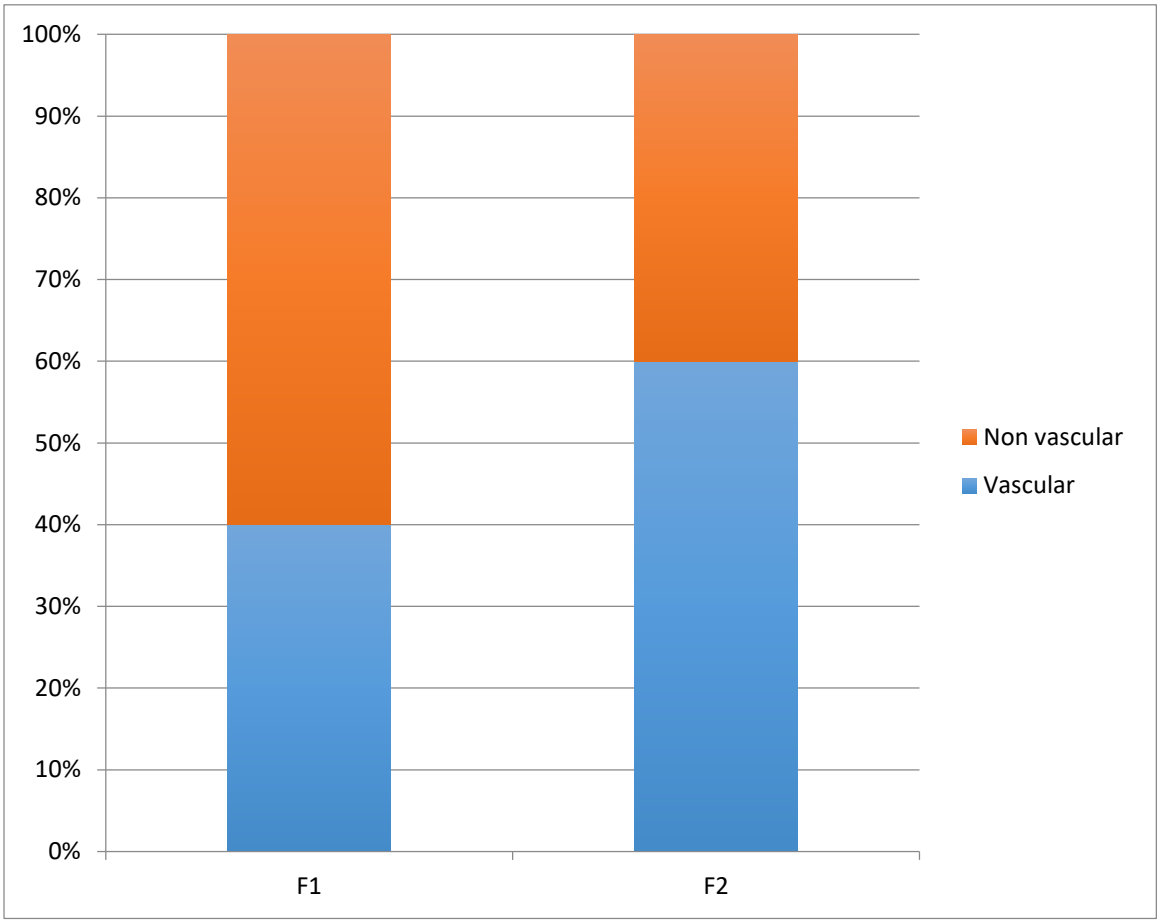
Minimum requirements for vascular interventions



Minimum requirements for non-vascular interventions



Distribution of vascular vs non-vascular requirements during the fellowship training



Outline for the clinical rotations during the fellowship training