

**GUIDELINES
MEDICAL EDUCATION**

UEMS Training Requirements for Angiology/Vascular Medicine: European Standards of Postgraduate Medical Specialist Training (2022 Updated Version)

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Introduction

The first European Training Requirements (ETR) Document in Angiology/Vascular Medicine (A/VM) was approved by the UEMS Council at the end of 2016 and was published by the UEMS Division of A/VM in 2017.¹

As scientific and technological advances have evolved in this specialty unevenly developed in Europe, an update was presented at the end of October 2021 at the UEMS Council and accepted.

We proceeded as follows: complete review of the 2015 Document; collection of comments from delegates of each country represented in the UEMS Division of A/VM as well as from representatives of National Scientific Societies; submission of a draft update to UEMS after taking into account all comments received; collection of comments from UEMS bodies (Specialist Sections) as well as from NMA (National Member Associations); collection of comments from UEMS reviewers; submission of the final version of the update to the UEMS Council after taking into account and answering all comments.

Below we present the updated recommendations for training in A/VM in Europe, a medical specialty derived from the common trunk of internal medicine.

This Document mainly concerns the Training Requirements for Trainees. The required competencies for the trainees are better specified. Composition and duration of training are more precisely defined to encounter the wishes of countries having the recognition of the specialty at the national level and of countries that would like to obtain the recognition. There is an evolution towards a trainees evaluation system that better meets international criteria (Grades of Competence System according to the CanMEDS 2015 Physician Competency Framework)² as well as those of the UEMS ETR Review Committee.

This updated ETR document **recommends** at least 5 certified years of training, consisting of at least 2 years Common Medical (Internal Medicine) Trunk training or a previously certified medical specialty AND at least 2 years training in an accredited (Nationally or European) Angiology/Vascular Medicine Center.

In countries setting up A/VM, where it is not possible to have all the requirements at the start, UEMS would be available to evaluate these initial training schemes, with a view to helping them become standard. This will help countries at the start of their journey to have A/VM as a (sub)specialty but still protect the standards required to work as an A/VM specialist in Europe. We emphasize that this Document is a “living” Document and that it will be updated regularly to reflect scientific and medical progress.

Preamble

The UEMS is a non-governmental organization representing national associations of medical specialists at the European Level. With a current membership of 37 national associations and operating through 43 Specialist Sections and European Boards, the UEMS is committed to promote the free movement of medical specialists across Europe while ensuring the highest level of training which will pave the way to the improvement of quality of care for the benefit of all European citizens. The UEMS areas of expertise notably encompass Continuing Medical Education, Post Graduate Training and Quality Assurance.

It is the UEMS’ conviction that the quality of medical care and expertise is directly linked to the quality of training provided to the medical professionals. Therefore the UEMS committed itself to contribute to the improvement of medical training at the European level through the development of European Standards in the different medical disciplines. No matter where doctors are trained, they should have at least the same core competencies.

In 1994, the UEMS adopted its Charter on Post Graduate Training aiming at providing the recommendations at the European level for good medical training. Made up of six chapters, this Charter set the basis for the European approach in the field of Post Graduate Training. With five chapters being common to all specialties, this Charter provided a sixth chapter, known as “Chapter 6,” that each Specialist Section was to complete according to the specific needs of their discipline.

More than 20 years after the introduction of this Charter, the UEMS Specialist Sections and European Boards have continued working on developing these European Standards in Medical training that reflects modern medical practice and current scientific findings. In doing so, the UEMS Specialist Sections and European Boards did not aim to supersede the National Authorities’ competence in defining the content of postgraduate training in their own State but rather to complement these and ensure that high quality training is provided across Europe. At the European level, the legal mechanism ensuring the free movement of doctors through the recognition of their qualifications was established back in the 1970’s by the European Union. Sectorial Directives were adopted and one Directive addressed specifically the issue of medical Training at the European level. However, in 2005, the European Commission proposed to the European Parliament and Council to have a unique legal framework for the recognition of the Professional Qualifications to facilitate and improve the mobility of all workers throughout Europe.

This Directive 2005/36/EC established the mechanism of automatic mutual recognition of qualifications for medical doctors according to training requirements within all Member States; this is based on the length of training in the Specialty and the title of qualification.

Given the long-standing experience of UEMS Specialist Sections and European Boards on the one hand and the European legal framework enabling Medical Specialists and Trainees to move from one country to another on the other hand, the UEMS is uniquely in position to provide specialty-based recommendations. The UEMS values professional competence as “*the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served.*” While professional activity is regulated by national law in EU Member States, it is the UEMS understanding that it has to comply with International treaties and UN declarations on Human Rights as well as the WMA International Code of Medical Ethics.

This document derives from the previous Chapter 6 of the Training Charter and provides definitions of specialist competencies and procedures as well as how to document and assess them. For the sake of transparency and coherence, it has been renamed as “Training Requirements for the Specialty of X.” This document aims to provide the basic Training Requirements for each specialty and should be regularly updated by UEMS Specialist Sections and European Boards to reflect scientific and medical progress. The three-part structure of this documents reflects the UEMS approach to have a coherent pragmatic document not only for medical specialists but also for decision-makers at the National and European level interested in knowing more about medical specialist training.

Angiology/Vascular Medicine in Europe

A/VM is the medical specialty dealing with Vascular Diseases (arterial, venous, lymphatic and microcirculatory diseases) and focuses on prevention, diagnosis, therapy and rehabilitation as well as research and education, to benefit patients and the general population. Angiology/Vascular Medicine are synonyms in different countries.

In some countries (Austria, Czech Republic, France, Germany, Hungary, The Netherlands, Poland, Slovakia, Slovenia, Switzerland) the specialty is recognized either as a primary (sub)specialty or following a Common Trunk. In other countries there are National Diplomas or Masters.

However, at the moment A/VM still does not reach the requirements for a primary specialty at the level of Euro-

pean Union. In fact, the process required for the European Union to include A/VM as a specialty in the annex V first requires recognition in at least 2/5th of the Member States (article 25), by a ‘qualified’ majority and submitted to the committee on qualifications of the European Commission. Secondly, to create a Specialist Section for A/VM within the UEMS, A/VM has to be recognized as an independent specialty by more than one third of the E.U. Member States and must also be registered in the Official Journal of the European Commission (Directive 205/36/EC). However, in most European countries Angiology exists in the NHS and these Centers are entrusted with the care of vascular patients in the medical area. There is expertise defined by this medical area to respond to the requests in demand from an increase in vascular diseases, the need for a prevention also in terms of evolution of the diseases, both linked to the ageing population and the social burden of chronic disease.

A/VM has extensive training background in Europe, first with the EWGMA (European Working Group on Medical Angiology), then as VAS (Vascular Independent Research and Education - European Organization - that in 2018 became VAS - European Independent Foundation in A/VM). Educational programs (European Master in A/VM, European Fellowship in A/VM and EU Advanced Postgraduate Courses) are offered with formal agreements thanks to the cooperation of VAS with European Universities and qualified Centers. Exchange and International collaboration are encouraged within these projects in close co-operation with UEMS.

Recognized in 2007 as a Division within the UEMS, it has produced a Chapter 6 that guided the evolution and in 2013, following the UEMS-CESMA indications, created, in collaboration with VAS, a European Board for the European Exam in A/VM, to become one of the specialties that today offer a CESMA-UEMS European Exam in A/VM to obtain the UEMS Diploma in A/VM.

The UEMS Division of A/VM has published the first Requirements for the Specialty (Chapter 6).¹ This document represents a further improvement and consolidation.

I **TRAINING REQUIREMENTS FOR TRAINEES**

The ultimate goal of training is to provide the best quality for care, in accordance with the principles of equity for patients, citizens and for the specialists in the right to education.

Europe still has major differences in its training and the programs provided. The differences are even more profound for A/VM.

It is crucial that the European population and patients have the same quality in medical care and prevention. This is only possible by providing high quality training programs, with European common contents, European standards, offered by qualified and validated Centers and should be based on training, standard methods and with appropriate equipment independently from the wealth of the individual countries.

This also responds to the aims of harmonization coordinated by UEMS.

1. Content of training and learning outcome

This Document statements of mission and outcomes must describe the competency-based training process to create a medical doctor able to undertake comprehensive up-to-date medical practice in A/VM in a professional manner, unsupervised and independently or within a team, in keeping with the needs of the health care system.

Appropriate innovation in the training process is encouraged for development of broader competencies than minimally required and constantly strive to improve patient care that is appropriate, effective, respecting human rights, dignity and equity in dealing with health problems and promotion of health. The training should prepare specialists for lifelong, self-directed learning and readiness for continuing medical education and professional development.

Presently the CanMEDS Framework is the most recognized and most widely applied health care profession competency framework in the world.² The use of a national competency-based framework for medical training is one reason why the Canadian medical education system is regarded as among the strongest in the world. We used some tools derived from this extremely complete document to defining the training requirements for trainees. This document allows to establish milestones to grade the competence system and to define the concept of EPA (Entrustable Professional Activities). EPA is a key task of a discipline that can be entrusted to an individual who possesses the appropriate level of competence.

However, because of the differences in emphasis and content of the various National Curricula, we currently keep a three levels gradation system that we are comparing with the grades of competence system (see Curriculum of training 2.2). We will develop this system gradually, which requires further discussions with the representatives of the different countries involved.

1.1. Professionalism and autonomy

The training process must strengthen professionalism of the doctor. The training should foster professional autonomy to enable the doctor to act in the best interests of the patient and the public.

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1.2. Training outcome

Competences, which must be achieved by trainees as a result of the training programs are described in the Curriculum. The extent of competence achieved by trainees should be used as feedback for program development.

1.3. Learning approaches

Postgraduate training must follow a systematic training program, which describes both the general and specialist components of training. The training must be practice-based involving the personal participation of the trainee in the services and responsibilities of patient care activities in the training institutions (taking into consideration the national rules). The training program must encompass integrated practical and theoretical instruction.

The training program include a defined curriculum to enable trainees to achieve the Program's learning outcomes. The curriculum includes specific learning outcomes and a syllabus of knowledge, skills and professional attitudes and behavior.

Training must include considerable experience with patient care in appropriate clinical settings, involving trainees in the supervised delivery of service and providing regular formal educational sessions that cover topics of value and of interest to the trainee.

Trainees should also have opportunities for self-directed learning and to create a personal development plan.

1.4. Scientific methods

The trainee must achieve knowledge of the scientific basis and methods of A/VM including understanding of research methodology, through exposure to a broad range of relevant clinical/practical experience in different settings, become familiar with evidence-based medicine and critical clinical decision-making.

The trainees should be involved in research projects. No-profit European collaborative projects which can facilitate exchange of experience and expertise should be recommended.

1.5. Training content

The training process must include extensive clinical work and relevant theory of the basic biomedical, clinical, behavioral and social sciences; clinical decision-making; communication skills, medical ethics, public health policy, general protection of the patients (palliative care, radiations), medical jurisprudence and managerial disciplines

required to demonstrate professional practice in the specialty.

1.5.1. COMPETENCIES REQUIRED OF THE TRAINEE

Specialists in A/VM should possess a defined set of knowledge, skills, and assessments, aiming to offer the best quality of care to patients.

Specialists should take care of the patient in a holistic way, taking into account ethical indications, social situations, characteristics and individual needs of the patient along with their theoretical and practical expertise. The patients should be made fully aware of their situation and provided with the tools to improve it, be helped to follow their therapy to prevent the evolution of the disease and complications.

A/VM specialists should apply their competencies to stimulate and understand the information provided by the patient, make appropriate clinical choices also through diagnostic and therapeutic interventions.

Therefore it is necessary for the specialist to possess sound knowledge not only in the context of specific expertise, but also within the framework of the local Health Services and the services available. They should have knowledge on communication, on patient education, ability in problem solving and **to work in a team**.

Regarding “Practical procedures”: it is important to note that, in some countries, depending on the national practices, some diagnostic exams are performed by specifically trained vascular laboratory qualified personnel. In those cases physician specialist in A/VM is not requested to directly perform these procedures, but he/she must know principles of the method and of its use, being able to indicate the procedure and interpret the results adequately.

In addition to this, specific knowledge about:

1.5.1.1. CLINICAL CONDITIONS (PATHOPHYSIOLOGY, EPIDEMIOLOGY, NATURAL HISTORY, PROGNOSIS, CLINICAL ASPECTS, DIFFERENTIAL DIAGNOSIS, TREATMENT)

1. Peripheral arterial diseases
2. Deep venous thrombosis
3. Superficial venous thrombosis
4. Chronic venous insufficiency
 - a. Varicose veins
 - b. Venous ulcers
5. Cerebral vascular diseases
6. Microcirculatory disorders
 - a. Raynaud phenomenon
 - b. Other vasospastic disorders
 - c. Diabetic microangiopathy

7. Thromboangiitis obliterans (Buerger's Disease)
8. Vasculitis
9. Thoracic outlet syndrome
10. Lymphedema
11. Lipedema
12. Renal vascular diseases
13. Splanchnic vascular diseases
14. Aortic and other arterial aneurysms
15. Arterial dissections
16. Cardiovascular risk factors, in particular
 - a. Arterial hypertension
 - b. Dyslipidemia
 - c. Hypercoagulable states: thrombophilia, cancer, paroxysmal nocturnal hemoglobinuria
 - d. Metabolic syndrome
 - e. Obesity
 - f. Diabetes mellitus
 - g. Smoking
 - h. Sedentary lifestyle
17. Vascular malformations
18. Vascular involvement in Orphan (rare) diseases: Ehlers-Danlos, Marfan, Loeys-Dietz
19. Vascular conditions (complex or unrecognized vascular syndromes, unusual thrombotic disorders) and the role of genetics
20. Prevention and education
21. Protection of the patient: radiations.

1.5.1.2. DISEASE MANAGEMENT

- Manage clinical, diagnostic and therapeutic protocols for vascular diseases
- Apply commonly used scoring systems for assessment of severity of illness/risk
- Evaluate each time the benefit-risk balance of the prescribed treatment report
- Manage the care of the critically ill vascular patient with acute medical conditions
- Identify the implications of relevant chronic and comorbid disease
- Identify and minimize risk of adverse events and complications
- Critically apply guidelines and protocols
- Identify and manage risk factors
- Interact with general practitioners and organize patient's follow-up
- Organize and take part in patient education
- Take active part in preventive measures and promote safe life styles for patients and population
- Facilitate multidisciplinary collaboration.

1.5.1.3. DIAGNOSIS

- Obtain a history and perform an accurate clinical examination
- Undertake timely and appropriate investigations
- Perform and interpret vascular ultrasound and other vascular and microvascular assessments
- Interpret clinical vascular imaging
- Define investigations for multiorgan localization also in collaboration with the other specialists
- Integrate clinical findings with instrumental and laboratory investigations
- Obtain appropriate microbiological samples and interpret results
- Stimulate multidisciplinarity, by interaction and collaboration with other bordering Specialists (Vascular Surgeons, Cardiologists, Neurologists, Nephrologists, Radiologists, Diabetologists, Thrombosis-Hemostasis Specialists, Geneticists, Dermatologists, Physical and Rehabilitation Medicine Physicians, Rheumatologists etc.) in respect of each reciprocal competence.

1.5.1.4. PRACTICAL PROCEDURES

- Perform ultrasound assessment for peripheral arteries
- Perform ultrasound assessment for carotid and vertebral arteries
- Perform ultrasound assessment for deep and superficial veins
- Perform ultrasound assessment for abdominal arteries
- Perform Ankle Brachial Index (ABI), segmental pressures and Toe Brachial Index (TBI)
- Perform walking distance (WD) evaluation and treadmill test
- Perform microcirculatory assessment (capillaroscopy, laser Doppler, TcPO₂ techniques)
- Perform transcranial Doppler and duplex
- Perform ultrasound assessment of brachial veins and/or arteries pre- and post-arteriovenous fistula
- Describe indications for laboratory risk assessment
- Apply venous/lymphatic contentive bandages
- Give indications for treatment of venous ulcers
- Perform or indicate sclerotherapy for varicose veins
- Perform or indicate thermoablation for varicose veins
- Perform or indicate phlebectomy
- Perform or indicate arterial interventional therapy
- Perform or indicate aortic interventional therapy
- Perform or indicate venous thromboembolic disease interventional therapy
- Manage the assessment, prevention and treatment of pain and other distress

- Stimulate interdisciplinary approach to establish indications for vascular surgery, endovascular therapy, preoperative work-up, aftercare

- Basic medical intensive care, especially in pulmonary embolism, acute limb, visceral ischemia, acute aortic syndromes

1.5.1.5. PROFESSIONALISM

- Communicate effectively with patients and relatives
- Communicate effectively with members of the health care team
- Maintain accurate and legible records/documentation
- Involve patients in decisions about care and treatment
- Demonstrate respect of cultural and religious beliefs and an awareness of their impact on decision making
- Respect autonomy, privacy, dignity, confidentiality and legal constraints on the use of patient data
- Collaborate and consult; promote team-working
- Ensure continuity of care through effective hand-over of clinical information
- Take responsibility for safe patient care
- Formulate clinical decisions with respect for ethical and legal principles
- Seek learning opportunities and integrate new knowledge into clinical practice
- Promote awareness and prevention of vascular diseases
- Promote awareness of vascular conditions possibly linked to genetic abnormalities and of the clinical genetic services
- Maintain independence from economical interest.

2. Organization of training

2.1. Composition and duration of training

European Core Curriculum could be considered for the basic content of the national training program.

The Core Curriculum **recommends** at least 5 certified years of training.

Training consists of:

- At least 2 years Common Medical Trunk training or a previously certified medical specialty and
- At least 2 years training in an accredited (Nationally or European) Angiology/Vascular Medicine Center.

The Core Curriculum foresees the optimal training on all the aspects of competence in Angiology/Vascular Medicine and defines the minimum requirements for the main skills.

One additional year (after completing the core curriculum) is requested for each of the further (optional) Additional Competencies/Curricula (see 2.2.2).

2.2. Curriculum of training

Three levels of autonomy are foreseen:

1. level 1 (able to choose the procedure and interpret the results; no experience in performing the procedures)
2. level 2 (same competences as level 1 plus able to perform procedures; limited supervision in routine);
3. level 3 (autonomy in all the competences, also in complicated cases; no supervision needed).

Decision-making autonomy (level 3) in the management of vascular disorders and risk factors, from the diagnostic, therapeutic and organizational points of view must be reached through training. The trainee should follow clinical cases on all the relevant specialist diseases.

All activity will be recorded in a Log Book and evaluated in terms of acquired expertise.

Vascular Medicine specialists should have complete clinical expertise of vascular diseases (including prevention, rehabilitation and patient education) and should reach Level 3 competence for non-invasive skills and Level 1 for invasive skills.

The Grades of Competence System including Entrustable Professional Activities (EPAs) is described below:

A. KNOWLEDGE

1. knows of
2. knows basic concepts
3. knows generally
4. knows specifically and broadly

B. CLINICAL SKILLS

1. Has observed — the trainee acts as an ‘Assistant.’ From complete novice through to being a competent assistant. At end of level 1 the trainee:

- a. Has adequate knowledge of the steps through direct observation.
- b. Demonstrates that he/she can handle instruments relevant to the procedure appropriately and safely.
- c. Can perform some parts of the procedure with reasonable fluency
2. Can do with assistance — a trainee is able to carry out the procedure ‘Directly Supervised.’ From being able to carry out parts of the procedure under direct supervision (trainer scrubbed) through to being able to complete the whole procedure under lesser degrees of direct supervision (e.g. trainer immediately available in theatre or in suite). At the end of level 2 the trainee

a. Knows all the steps - and the reasons that lie behind the methodology

b. Can carry out a straightforward procedure fluently from start to finish

c. Knows and demonstrates when to call for assistance/advice from the supervisor (knows personal limitations).

3. Can do whole but may need assistance — a trainee is able to do the procedure ‘Indirectly Supervised’. From being able to carry out the whole procedure under direct supervision (trainer immediately available in theatre) through to being able to carry out the whole procedure without direct supervision *i.e.* trainer available but not in direct contact with the trainee. At the end of level 3 the trainee

a. Can adapt to well-known variations in the procedure encountered, without direct input from the trainer

b. Recognizes and makes a correct assessment of common problems that are encountered

c. Is able to deal with most of the common problems

d. Knows and demonstrates when he/she needs help

e. Requires advice rather than help that requires the trainer to scrub

4. Competent to do without assistance, including complications. The trainee can deal with the majority of operative problems and complications, but may need occasional help or advice

5. Can be *trusted* to carry out the procedure, independently, without assistance or need for advice. This concept would constitute one **Entrustable Professional Activity (EPA)** and is elaborated further on in theses ‘Comments’.

At the end of level 5 the trainee:

a. Can be trusted to deal with straightforward and difficult cases to a satisfactory level and without the requirement for external input to the level at which one would expect a consultant angiologist/vascular physician to function

b. Is capable of instructing and supervising trainees.

C. TECHNICAL SKILLS

1. Has observed
2. Can do with assistance
3. Can do whole but may need assistance
4. Competent to do without assistance, including complications, but may need advice or help
5. Can be *trusted* to carry out the procedure, independently, without assistance or need for advice (EPA).

A UEMS certified specialist in A/VM should reach:

- Grade A4 Knowledge in Angiology (Vascular Medicine);

- Grade B5 Clinical Skills in Angiology (Vascular Medicine);
- Grade C5 Technical Skills for non-invasive procedures in Angiology (Vascular Medicine);
- Grade C1 Technical Skills for invasive procedures.

A UEMS certified specialist for Optional Additional Curricula should additionally reach Grade C5 Technical Skills in the specific area of expertise.

2.2.1. SKILLS

Number of procedures required to reach autonomy:

- Perform ultrasound assessment for peripheral arteries
- Perform ultrasound assessment for carotid and vertebral arteries
- Perform ultrasound assessment for deep and superficial veins
- Perform ultrasound assessment for abdominal arteries
- Minimum 1000 personally performed (minimum 200 per category) to reach Level 3
- Perform ABI, segmental pressures and TBI
- Perform walking-distance evaluation and treadmill test
- Minimum 100 personally performed to reach Level 3
- Perform microcirculatory assessment (capillaroscopy, laser Doppler, TcPO₂)
- Minimum 100 personally performed to reach Level 3
- Perform transcranial Doppler and duplex
- Minimum 60 assisted to reach Level 2 or 100 personally performed to reach Level 3
- Perform ultrasound assessment of brachial veins and/or arteries pre- and post-arteriovenous fistula
- Minimum 60 assisted to reach Level 2 or 100 personally to reach Level 3
- Perform venous and lymphatic bandaging
- Minimum 60 personally performed to reach Level 3
- Give indications and supervise treatment of venous ulcers
- Perform or indicate sclerotherapy for varicose veins
- Minimum 10 as observer (including the possibility to follow recorded training sessions) (Level 1). For optional additional curriculum 2 (see 2.2.2)
- Perform or indicate thermoablation for varicose veins
- Minimum 10 as observer (including the possibility to follow recorded training sessions) (Level 1). For optional additional curriculum 2 (see 2.2.2)
- Perform or indicate phlebectomy
- Minimum 10 as observer (including the possibility to follow recorded training sessions) (Level 1). For optional additional curriculum 2 (see 2.2.2)

- Perform or indicate arterial interventional therapy
- Minimum 50 as observer (including the possibility to follow recorded training sessions) (Level 1). For optional additional curriculum 1 (see 2.2.2)

- Patients education sessions
- Minimum 40 personally performed to reach Level 3
- Describe indications for laboratory risk assessment.

Also requested Level 1 to provide guidance and interpret.

Angiography, angio CT, angio NMR, phlebography, lymphography and nuclear medicine techniques also in interaction with radiologists.

Also requested Level 1 for procedures and Level 3 to monitor the follow-up of (in collaboration, when necessary, with other specialists):

- Vascular reconstructive surgery
- Venous surgery
- Lymphatic surgery
- Abdominal vessel surgery
- Major and minor amputations.
- Neurology (cerebral vascular diseases)
- Nephrologists (renal vascular diseases).

2.2.2. OPTIONAL ADDITIONAL CURRICULA

Further expertise is available for specialists **that have already completed the Training in A/VM** (UEMS European Diploma in A/VM and/or National Specialty Diploma on A/VM) in:

- Endovascular (both arterial and venous) interventional therapy (Interventional Angiology)
- Venous procedures.

2.2.2.1. ADDITIONAL CURRICULUM IN INTERVENTIONAL ANGIOLOGY (ADDITIONAL CURRICULUM 1)

Endovascular interventional therapy is an area of treatment which is common to multiple specialties (Vascular Surgery, Radiology, Cardiology and Angiology/Vascular Medicine). For A/VM, this interventional treatment is commonly practiced in some countries as part of the training Curricula of this Specialty, and is also practiced by some angiologists in other countries where the specialty is not recognized.

Indications for endovascular procedures in:

- Patients with advanced form of peripheral arterial disease (Fontaine Stage III, IV);
 - With rest pain or non-healing ischemic ulceration;
 - Lifestyle limiting claudication despite risk factor modification, conservative treatment and appropriate exercise program.

- Patients with significant stenosis of extracranial carotid and vertebral arteries as appropriate. This kind of highly specialized medicine is only possible for a Angiologist/Vascular Physician who has a training in a selected and certified Neurovascular center according to the European UEMS Guidelines for training and practice
- Patients with renal and splanchnic artery stenosis as appropriate
 - Patients with arterial aneurysms
 - Patients with aortic diseases
 - Acute deep venous thrombosis
 - Chronic deep venous thrombosis in post thrombotic syndrome.

Endovascular revascularization procedures in arterial system:

- Endovascular revascularization procedures include balloon angioplasty with or without stent placement, atherectomy, mechanical/pharmaco-mechanical thrombectomy, laser atherectomy, cryoplasty, cutting-balloon angioplasty, drug-eluting balloons, re-absorbable stents, and drug-coated stents, coiling, and stent graft implantation.

Endovascular procedures in deep venous system:

- Catheter directed thrombolysis, mechanical and pharmaco-mechanical thrombectomy of acute DVT, recanalisation and stenting of chronic DVT in patients with PTS.

The lists of the endovascular procedures are not exhaustive and are evolving according to the evolution of technology.

A minimum of 250 personally performed procedures (with detailed portfolio) are required for level 3.

2.2.2.2. ADDITIONAL CURRICULUM IN VENOUS PROCEDURES (ADDITIONAL CURRICULUM 2)

Venous procedures are an area of treatment which is common to multiple specialties (Vascular Surgery, Radiology, Dermatology and A/VM). For A/VM, this treatment is commonly practiced in many countries with defined training programs. The procedures require an in-depth knowledge of ultrasound and clinics and are also suitable for specialists in the medical area.

Techniques concerned:

- Endovenous laser treatment (EVLT)
- Radiofrequency (rF)
- Foam sclerotherapy
- Mechano-chemical ablation.

Prerequisites:

- extensive clinical knowledge of superficial venous disease and preliminary training in venous ultrasound are required;

- practice vein puncture under ultrasound guidance (e.g. ultrasound-guided sclerotherapy) and practice the technique of phlebectomy is also recommended.

Contents:

Theoretical education:

- theory
 - Physical principles of different techniques – therapeutic indications
 - Therapeutic strategy
 - Complications
 - Contraindications
- conditions
 - Environment
 - Hygiene
 - Specific equipment

Teaching practice:

- Ultrasound-guided puncture
- Overview of puncture's material (introducers)
- Puncture phantom

Use of devices:

- Presentation of different materials: rF, EVLT, etc.
- Hands-on phantom (guides, catheter fibers)

Tumescent anesthesia:

- How to do it (syringe pump)
- Hands-on phantom (if possible)

Analysis procedures (video and live)

Tips and tricks

Management of technical difficulties (navigation, etc.) and patient-related difficulties (stress, needle phobia, etc.)

Management of complications

Clinical cases:

- Discussion of the technique
- Discussion of practical modalities of realization (vascular access catheter placement or fiber)
- Attending "live" procedures in SSV and GSV
- Intervening actively in procedures (all or part of the proceedings: vein puncture under ultrasound guidance, navigation of the thermal probe, tumescent anesthesia, firing and pull back).

A minimum of 100 personally performed procedures (with detailed portfolio) are required for level 3.

2.3. Assessment and evaluation

Postgraduate medical training must include a process of assessment. The methods used for assessment of trainees, including the criteria for passing examinations or other types of assessment must emphasize formative in-training methods and constructive feedback. Assessment principles, methods and practices must be clearly compatible

via a teleconference between each candidate and the three examiners has been set up.

The **final exam grade**, for each candidate, represents the average of the two grades, the first from the written exam, the second from the clinical case exam.

The commission requires a final grade of at least 6.5 (on a 1-10 scale), in order to validate the exam.

II TRAINING REQUIREMENTS FOR TRAINERS

1. Appointment Policy

All physicians should as part of their professional obligations recognize their responsibility to participate in the practice-based postgraduate training of medical doctors. Staff policy should ensure that teachers are active in the relevant field and that teachers in sub-areas are only approved for relevant specific periods during training.

1.1. Obligations and development of Trainers

Teaching activities must be included as responsibilities in the work schedules of trainers and their relationship to work-schedules of trainees must be described.

The ratio between the number of recognized trainers and the number of trainees should ensure close personal interaction and monitoring of the trainee.

1.2. Program Director

The Program Director must:

- have at least 5 years of participation as an active faculty member in an A/VM program
- be certified in A/VM (Specialty or CESMA-UEMS European Diploma)
- be responsible to the sponsoring organization
- oversee and organize the activities of the educational program in all institutions that participate in the program
- ensure the implementation of fair policies, grievance procedures, and due process are in place in all institutions that participate in the program
- have appropriate dedicated time to devote to the program
- ensure that all training institutions participate in the required quality assurance.

1.3. Educational Supervisor

Each trainee must have an educational supervisor. One such individual might be responsible for all trainees at one site or alternatively this might be allocated to several individuals.

The educational supervisor must:

- be certified in A/VM (Specialty or CESMA-UEMS European Diploma)
 - arrange to meet with each trainee at the beginning, middle and end of each placement or every 2-3 months
 - assess progress and professional development of the trainee
 - ensure that the trainee has access to the training and clinical experience necessary to meet curricular requirements
 - ensure that there is an appropriate balance between service and training
 - check that the necessary work-based assessments are carried out
 - receive feedback from the trainee about the training provided and make necessary changes.
 - provide counselling to trainees as appropriate.

III TRAINING REQUIREMENTS FOR TRAINING INSTITUTIONS

The European Training Centers (ETC) previously called European Teaching Centers (see Chapter 6) must offer training that fit the European quality criteria and programs suitable for the European Curriculum.

They take part on the educational European programs (VAS European Master, European Fellowship, International Academy etc.) and are the reference Centers for training programs finalized to the UEMS Exam for the UEMS European Diploma in A/VM.

They can be formed from one Centre or from more institutions with a Centre of reference coordinating other smaller Centers or institutions with specific expertise to offer a complete range of educational opportunities. In the case of multicenters organization the Centre of reference must create an Educational Committee (joining Trainers from the different institutions) to coordinate and monitor the educational program.

1. Process for recognition as European Training Centre

Training must be carried out in Certified Centers.

Due to the fact that the ETC could involve more than one institution cooperating with the A/VM referee Centre, part of the training could take place in other relevant hospitals or institutions and community-based facilities.

They must have sufficient clinical facilities and infrastructures to support the delivery of training.

Training locations must have a sufficient number of patients and an appropriate case-mix to meet training objec-

tives. They must have adequate teaching staff. The training must expose the trainee to a broad range of experience.

The number of patients and the case-mix should allow for clinical experience in all aspects of A/VM including training in health promotion and disease prevention. The quality of training settings should be regularly monitored.

2. Angiology/Vascular Medicine expertise and organizational integration

The Center must present, in addition to the general characteristics outlined in the other sections of the document, a study format relevant to the training of Tutors which covers the major specialist skills for A/VV. Collaboration with Centers is admissible so that any areas not covered by a single Centre can be covered by one or more complementary Centers.

A ETC can be represented by:

- only one Center offering the entire spectrum of training, or
 - a Reference Center flanked by other Centers (which will be part and parcel of an A/VM ETC) with specific complementary skills, or
 - by one of the preceding solutions with the integration of minor Centers, even small, but of verified quality, to broaden the clinical training in its more advanced stages. These facilities will be considered an integral part of ETC
 - Coordinated multi-site training should be ensured to gain exposure to different areas and management of the discipline.

The training Centre should include an acceptable number of clinical cases (to guarantee the Core Curriculum) within the area of:

- Arterial disease (peripheral, CVD, abdominal)
- Venous diseases (TED and CVI)
- Microcirculation disease
- Lymphedema
- Major risk factors
- Vascular malformations
- Prevention.

It must also ensure:

- Educational programs (also by the existing certified VAS European platform for e-learning), meetings
- Research activity
- Computerized bibliographic research and consultation areas
- Interdisciplinary confrontation to include either meetings on specific topics of discussion on selected clinical cases

- Patient and population education programs
- Contacts/meetings with family doctors.

These activities include the use of appropriate instruments.

All equipment should be registered. Some marginal differences exist in European countries.

The list below will be automatically updated to include affirmed scientifically accepted innovative methods.

- Vascular ultrasound to study the arteries and veins of the upper and lower limbs, neck and abdomen
- Capillaroscopy and at least one of the other methods to study microcirculation (such as laser Doppler, $TcPO_2$)
- Doppler for ABI and segmental pressures measurement
- Doppler or laser Doppler for Toe Pressure Index
- Treadmill tests
- Transcranial Doppler and duplex
- Plethysmography (can be replaced by ultrasound or, for the study of microcirculation, by microcirculation methods)
- Ambulatory blood-pressure monitoring (even within the host hospital)
- Coagulation/risk factors monitoring facilities
- Ulcers treatments and bandages.

Additional services (mandatory for Training Centers requesting additional optional accreditation for Curriculum 1 and/or Curriculum 2):

- Arterial/venous Interventional area and facilities
- Facilities for varicose veins treatment (thermoablation, sclerotherapy).

Services related to multidiscipline approaches must be available in the ETC to facilitate interactions. In fact, interdisciplinary collaboration with other Units/Depts. or Specialists are considered part of modern medicine and essential for good training. In particular it will be stimulating interactions with vascular surgery, radiology, diabetology, neurology, cardiology, thrombosis, dermatology, rheumatology, physical and rehabilitation medicine physicians, genetic medicine, epidemiologists/statisticians and sometimes other ones.

3. Minimum number of case studies and exams

In terms of the minimum number of case studies and exams required for an ETC, the entire offer should be considered.

However, the minimum criteria to be considered should be:

- In-patients at the Center itself or from other departments for consultations or hospitalization. (This joint offer

has been considered in view of the different organizations or organizational trends of NHS on hospital stays): minimum/year $N=1000$

- Outpatient instrument examinations minimum/year
N=4000

- Outpatient visits minimum/year $N=1000$.
All vascular diseases should be covered above, with obvious respect for the epidemiological distribution.

From the instrumental point of view, each district of vascular ultrasound must be present, again with respect to epidemiology.

Only data from official records (computerization of the structure) will be considered for the validation process.

For Centers seeking further additional accreditation in:

3.1. Arterial interventional therapy

What has previously been mentioned in the subchapter “Additional Curriculum in Arterial Interventional Therapy” on the border areas among different Specialties and on the existence of consolidated practice in different Countries should be taken into account. The Center applying must already be accredited as a European Training Center in A/VM.

3.1.1. GENERAL

The minimum of medical service available must be a functional interventional/endovascular unit. This might be ideally available and located in an angiology, cardiology or radiology catheter laboratory. The minimum infrastructure: there must be a fluoroscope which can be used to do arterial endovascular procedures and which is able to store and reproduce all the images done during the procedure. At a minimum the images must be able to be printed out in paper form, the better if hard copies or digital files can be reproduced. If the manpower and expertise exist in a center, meaning experienced interventionalists as being defined below, this fluoroscope can also be anchored in whatever ward or medical suite, *e.g.* in an intensive care unit with a special surgical theatre. Another important acquisition at a minimum level at such a place must be a certificate that the radiation protection rules at the place are fulfilled. At such a training place at least one experienced interventionalist must be placed, who is able to fulfill the training skills. The minimum number of patients treated at a Training Centre must be 50 per year, for each main disease area.

3.1.2. EQUIPMENT

The minimum of equipment must be a fluoroscope with the ability to capture and store the images of the procedure.

dure. It must fit all necessary legal conditions referring to international radiation protection conditions. Furthermore the endovascular unit must be equipped with an ECG and blood pressure measurement facility, so that the patient can be monitored during the procedure. First-aid equipment must be within reach, so that in emergency cases the patient can be taken care of. A Duplex ultrasound machine is necessary for diagnostic procedures (retroperitoneal hematoma, immediate follow up after the procedure in case of suspicion of acute re-occlusion and so on). Experienced staff with a surveillance facility to take care of the patient in the time span before and after the procedure is also needed.

3.1.3. TUTORS/QUALIFIED ENDOVASCULAR SPECIALISTS

The minimum number of tutors for a Training Centre is one, who must have a certificate that allows her or him to perform endovascular procedures on her/his own and she/he must provide at least a 2 year's self-standing experience in endovascular procedures. The numbers of qualified doctor with the same requirement as that of the tutor can be the same. It is also sufficient if the tutor and the qualified doctor are the same person. Experienced nurses or technicians are a must and there must be at least one available.

3.1.4. QUALIFICATION OF THE PERSON RESPONSIBLE AND/OR TUTOR:

- For teaching (in general see general document): the person who is responsible for the teaching process must have theoretical knowledge about endovascular arterial interventions also practical by having at least assisted during these interventions;
 - for arterial interventional treatment: the person who is responsible for arterial interventional treatment must provide evidence of one-year training and one-year self-standing experience in endovascular interventions. The required number of is 100 interventions in each main arterial disease region assisted.

3.1.5. FACILITIES

The further facilities necessary for a European Training Center in arterial intervention already exist as they are accredited ETCs. There are outpatient clinics where patients can be screened and assessed before the procedure, with at least one duplex ultrasound machine and an ABI measurement facility. During the screening process the physical exam, the medical history and ABI as well as ultrasound of carotid arteries must be captured. Therefore a PC to capture patient data as well as a substitute

a paper patient record is necessary. Concerning the after the endovascular procedure treatment and surveillance the Training Centre must be equipped with a ward, where experienced and trained nurses, as well as medical doctors who have at least a training in recognizing and handling complications after an endovascular procedure, are available.

3.1.6. SURROUNDING CONDITIONS

A Training Center must cover all the necessary “surrounding conditions”, therefore the presence of a hematology laboratory is necessary, as before the procedure necessary lab assessments as creatinine and coagulation levels are mandatory.

Active collaboration is necessary and mandatory with a special vascular surgical department, as in case of emergencies a vascular surgeon must be on standby. Furthermore there must be an active collaboration with a radiology suite which must provide the expertise on diagnostic images (MRI, CT).

3.2. Venous procedures

What has previously been mentioned in the subchapter “Additional Curriculum in Venous Procedures” on the border areas among different Specialties and on the existence of consolidated practice in different Countries should be taken into account.

The Center applying must already be accredited as a European Training Center in A/VM.

3.2.1. TECHNIQUES

- Thermal ablation techniques
 - Radiofrequency (rF)
 - Endovenous laser treatment (EVLT)
- Sclerotherapy
 - Sclerotherapy under direct vision with liquid or foam
 - Ultrasound-guided foam sclerotherapy (USGFS)

3.2.2. THE INSTRUCTOR(S)

Required:

- Vascular doctor (or equivalent depending on country)
- Not subject to any judicial procedure or liable of any criminal offence
- Practicing the technique in question for at least 3 years, with (thermal ablation) at least 100 procedures performed over the last year and (sclerotherapy) at least 200 procedures of USGFS performed over the last year.

Recommended:

- Practice of one or several alternative techniques (surgical, thermal or chemical).

- Experience in the field of education (Provide training of trainers in order to homogenize the educational aspect - specification of skills and items to provide full guidance for the trainer in all his actions)

3.2.3. ENVIRONMENT

Area (reception, offices, archives, examination rooms, treatment rooms, recovery...): According to legislation in force in the country concerned.

3.2.4. EQUIPMENT AND MATERIALS

Non-specific equipment (general medical equipment, appropriate emergency equipment, containers for medical waste disposal, according to current legislation)

Equipment suitable for venous Doppler exploration, especially superficial.

- a) Specific tools for thermal ablation techniques:
 - Generators comply with current maintenance certificates
 - Goggles and probes for Laser
 - Suitable probes, puncture material, catheters, long and short guides
 - Masks, caps, scrubs
 - Sterile drapes, sterile gowns
 - Materials for local anesthesia, tumescent pump
- b) Specific equipment for sclerotherapy:
 - Syringes, needles
 - Equipment for the manufacture of sterile foam or not (according to legislation).

3.2.5. PERSONNEL REQUIRED

None for sclerotherapy; scrub nurse and assistant (runner) during thermal procedures.

Reception students: 1-2 students per trainer.

Opportunity for students to attend the consultation and the process leading to the indication of the technique and the conduct of the procedure and the follow-up consultation.

Encourage the grouping of 2-3 procedures in the same unit of time (1 day or half-day for example). Allow the student to actively take part in the diagnosis, the indication and during the procedure; specific work on the incident / accident during the procedure to be ready to react properly in case of difficulties per - procedure.

Evaluation of the training; control theory, practical control (development of a uniform evaluation procedure applicable in all Centers).

Further additional accreditation of the ETC in “Venuous Procedures” should be done also in collaboration with UEMS MJC Phlebology.

4. Training structure

4.1. Clinical training

The core experience of trainees must provide training in vascular in and outpatients (investigation, treatment and education) and in the prevention of vascular diseases.

The learning environment must be favorable and the trainee must have stable defined figures of reference.

Trainees must have substantial experience of conducting ward rounds, both under direct supervision of a training physician and independently. Trainees early in the program will require considerable supervision but this will gradually become less as experience is obtained. All trainees must be able to seek help from a more experienced colleague who must be available to provide on-site support.

Trainees must have primary responsibility for a sufficient number of unselected patients.

Clinical experience in A/VM must be gained as well as in other related disciplines (for defined periods).

Trainees must have experience of follow up clinics in order that they understand the natural history of acute illness and care of chronic illness.

4.2. Procedures

Trainees must be given instruction in relevant procedural skills. They must be aware of the indications, contraindications, complications, limitations, and interpretations of findings of the procedures commonly undertaken by specialists. They must be given the opportunity to perform the relevant procedures under supervision prior to being judged competent to perform these independently.

4.3. Educational program

Formal teaching sessions in the form of seminars, grand rounds and case conferences as well as e-Learning material (including European courses) should cover the whole A/VM curriculum.

International/European and National Guidelines must be available and discussed.

5. Structure and human resources

- The reference centers for the ETC should be a public facility (Hospital or University) accredited to the NHS
- The Head of the Unit should be a specialist in A/VM or relevant discipline, should have at least 10 years cur-

riculum and publications in this area, given the differences in the distribution of the Specialty in Europe. The reference Centre will Coordinate the entire ETC.

- Medical staff should be minimum Head + three Tutors to train each candidate. The tutor should be a specialist in A/VM or must hold a UEMS Diploma in A/VM. Each Tutor should, as a rule, follow a maximum of three Trainees.
- The role of Program Director and Educational Supervisor should be identified
- Technical and nursing staff must be available

6. Duration of ETC Accreditation

• Completed the Validation Process by VAS, obtained Accreditation from the UEMS Division A/VM, the title will last for 5 years, if during that time no problems arise from the Trainers' reports, from eventual intermediate evaluative tests or from staff working at the Centre.

• After this period the Centre may apply to renew its accreditation, which will be renewed automatically in absence of negative reports from Trainers and Trainees and if the Centre maintains its documented standard.

7. Management of training

The responsibility and authority for organizing, coordinating, managing and assessing the individual training setting and the training process must be clearly identified and is the responsibility of the Program Director and Training Program team.

7.1. Requirement on equipment, accommodation

The trainee must have adequate time and opportunities for practical and theoretical study and have access to adequate professional literature as well as equipment for training of practical techniques.

The physical facilities and equipment for training should be evaluated regularly for their appropriateness and quality regarding postgraduate training.

7.2. Quality management within training institutions

7.2.1. ACCREDITATION

Recognition of Teachers and Training Institutions at a national level: the training in A/VM is regulated by National Authorities/National Boards, which set standards in accordance with national rules and EU legislation. The standard for recognition of training institutions (Training Centers), teachers and trainers are defined by national authorities, in accordance with national rules and EU legislation.

In countries where qualified A/VM Centers do not ex-

ist, applicants can make motivated requests to carry out their period of training in the accredited European Training Centers from other European countries (Validation Process).

VAS ETC Validation Committee, acting in the name of the UEMS Division of A/VM, will Validate the fulfilment of criteria.

Centers applying for Accreditation could propose or receive, during the Validation Process, indication to cooperate with other A/VM Centers or Centers with other Specialist structures (consistent with the purpose and the training curriculum) to expand the training offer.

The Validation Process and the consequent Accreditation recognize the 1997 UEMS visitations Charter and its principles and any further up-date.

Only once the ETC has obtained Accreditation can it also apply (following the mentioned criteria) for further Additional Accreditation as a ETC for:

- Venous procedures
- and/or
- Arterial interventional

8. Therapy clinical governance

The clinical training must include experience in working as a team with medical colleagues and other health professionals. The training process should allow learning in a multi-disciplinary team resulting in the ability to work effectively with colleagues and other health professions as a member or leader of the health care team and should develop competencies in guiding and teaching other health professions. The Program should include training in Communication, Team working skills and Equity and Diversity.

Completion of training must be documented by degrees, diplomas, certificates or other evidence of formal qualifications conferred as the basis for formal recognition as a competent medical doctor in A/VM (National level). At EU level, applications for the UEMS Exams are stimulated to obtain the UEMS European Diploma in A/VM and VAS European Fellowship.

9. Manpower planning

Manpower planning is under the jurisdiction of each member state according to their needs for A/VM specialists. The EBEAVM will produce proposals with a European outlook.

10. Regular report

Each year a detailed report is requested to evaluate the training period.

11. External auditing

Is possible, both in the Validation and Accreditation phase and during the activity of the Centre.

12. Transparency of training programs

Training programs are published and the activities registered in a logbook.

13. Evaluation of training process

13.1. Mechanism for program evaluation

Feedback from trainees must be incorporated into the review of the program.

Program evaluation should address the context of the training process, the structure and specific components of the program and the general outcomes.

13.2. Feedback from trainers and trainees

Feedback about program quality from both trainers and trainees must be systematically sought, analyzed and acted upon.

Trainers and trainees should be actively involved in using its results for program development.

14. Continuous renewal

The process of renewal should be based on prospective surveys, analyses and audits that should lead to the revisions of the policies and practices of the postgraduate medical training programs in accordance with past experience, present activities and future perspectives. In so doing it should address the following issues:

- Adaptation of the mission and outcome objectives of postgraduate training to the scientific, socio-economic and cultural development of the society
- Modification of the competencies required on completion of the postgraduate training program in A/VM in accordance with the needs of the environment the newly trained doctor will enter
- Adaptation of the learning approaches and training methods to ensure that these are appropriate and relevant
- Development of assessment principles and methods according to changes in training objectives and methods
- Adaptation of recruitment and policy of appointment of supervisors and teachers according to changing needs in postgraduate training
- Updating of training settings and other educational resources to changing needs of postgraduate training, *i.e.* the number of trainees, number and profile of trainers, the training program and contemporary training principles
- Refinement of the process of training program monitoring and evaluation.

Adjustment of the structure, content and duration of training programs in keeping with the developments in the basic biomedical sciences, the clinical sciences, the behavioral and social sciences, and changes in the demographic profile and health or disease pattern of the population, and in socio-economic and cultural conditions.

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