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## Position Paper on Young Vascular Surgeons Training of the Mediterranean Federation for the Advancing of Vascular Surgery (MeFAVS)

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# Position Paper on Young Vascular Surgeons Training of the Mediterranean Federation for the Advancing of Vascular Surgery (MeFAVS): State of the Art and Perspectives

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The Mediterranean Federation for the Advancing of Vascular Surgery (MeFAVS) was founded in 2018, with the aim to promote cooperation among vascular professionals within Mediterranean

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countries. Due to its prominent social and economic impact on national health systems, diabetic peripheral artery was selected as the very first topic to be investigated by the federation. In this second paper, different experiences from delegates of participating countries were shared to define common strategies to harmonize, standardize, and optimize education and training in the Vascular Surgery specialty.

## INTRODUCTION

Large disparities are prevalent in Vascular Surgery training amongst and within the countries that make up the *Mediterranean Federation for Advancing Vascular Surgery* (MeFAVS), a federation founded in 2018 to enhance clinical, educational and scientific cooperation amongst vascular surgery centers of the countries surrounding the Mediterranean basin including Italy, France, Spain, Portugal, Greece, Croatia, Albania, Morocco, Algeria, Tunisia, Egypt, Lebanon, and Middle East. Taking part as well were MeFAVS network supporting member centers from Germany, Sweden and the Benelux countries. One of the first collective studies undertaken by our federation was the carrying out and publication of a survey on management of diabetic foot; a major concern for all healthcare systems of the countries involved.<sup>1,2</sup>

Recently a webinar was held on March 18, 2021 with the objective of describing members' residency training programs and to share experiences and define common strategies in an attempt to harmonize, standardize, optimize education and training in vascular surgery (VS). Delegates from Algeria, Belgium, Croatia, Egypt, France, Germany, Greece, Italy, Lebanon, the Netherlands, Portugal, Spain, Sweden and Tunisia were asked to report specific country findings on the subject meeting.

Data was presented on the period of training, utilization and duration of common trunk training in general surgery or other disciplines, the recording of procedures in residency logbooks, final examinations, designation as Fellow of the European board of Vascular Surgery (FEBVS), and the adherence to a national independent Vascular Surgery Society which was collected and is contained in [Table I](#).

## EXPERIENCES

*Algeria.* In Algeria, Vascular Surgery is an independent surgical specialty and total training duration is 5 years. No entry test is required. Residents complete their first year in a surgical emergency department. The second year takes place in a vascular surgery department. During this year, the resident or trainee learns the basics of vascular and endovascular surgery directly in the operating room assisting by senior surgeons where they learn about vascular exploration and duplex ultrasound. They also receive theoretical instruction at the rate of 1 lecture per week provided by a professor of vascular surgery. The 3rd year of residency is divided into 2 semesters as an intern: one internship semester in a cardiac surgery department and the second internship semester in a thoracic surgery department. In this,

**Table I.** Vascular surgery in MeFAVS network supporting member countries

Country	Total training duration y	Monospecialty	Common trunk	Duration of CTy	Entry test	Log book	Final exam	National Certification	National Society	FEBVS	Foundation
Algeria	5	yes	yes	1	no	yes	yes	yes	no	...	...
Belgium	6+2	no	yes	not defined	no	yes	yes	as General Surgery	BVS	no	1992
Croatia	5	yes	yes	not defined	no	yes	yes	yes	CSVS	...	1996
Egypt	5	yes	yes	2	no	yes	no	no	VSE	no	2004
France	5	yes	yes	not defined	yes	yes	yes	yes	SCVE	...	1986
Germany	6	yes	yes	2	no	yes	yes	yes	DGG	...	1984
Greece	7	yes	yes	3	no	yes	yes	by Minister of Health	HVS	...	1981
Italy	5	yes	yes	1	yes	yes	yes	by University	SCVE	not compulsory	1974
Lebanon	2 (after 5-year General Surgery residency)	yes	no	no	no	yes	no	no	LSVS	...	1992
Portugal	6	yes	yes	1	yes	yes	yes	by Portuguese Medical Association	SPACV	not compulsory	1983
Spain	5	yes	yes	1	yes	yes	no	by Minister of Health	SEACV	not compulsory	1978
Sweden	5	yes	yes	1	no	yes	no	yes	SSVS	not compulsory	2015
The Netherlands	6	no	yes	4	no	yes	yes	yes	RWV	required	1985

residents become even more integrated into the activities of vascular and endovascular surgery and in vascular surgery emergencies.

At the end of last year's residency program, each resident has to complete the national examination.

A logbook of clinical and surgical activities has to be provided by each resident. The logbook is validated every year by the head of the vascular surgery department. At the end of the residency program, the logbook requires validation from the president of the national educational committee. This validation is mandatory to access the national examination.

The final national examination is evaluated on a point basis. In addition, during the years of training, the evaluation is conducted according to fixed objectives that must be achieved at each year of residency. These include surgical activity as well as attendance at conferences and department meetings. The national examination for specialized medical studies corresponds to the training conclusion. This includes a theoretical test with a requirement for exhaustive answers to 1 or 2 questions on topical and innovative subjects and a practical test on research of the patient files.

*Belgium.* In Belgium Vascular Surgery requires an additional 2-year fellowship after completion of 6 years of General Surgery in which rotations in Emergency and Intensive Care Units are mandatory. Accumulated procedures and skills are collected in a logbook with reports on the different rotations and the years spent in peripheral teaching hospitals. Evaluation of the logbook is a crucial part of the final examination in General Surgery. FEBVS designation is recommended but not mandatory.

Founded in 1992, the BSVS – *Belgian Society for Vascular Surgery* (*Belgisch Genootschap voor Vaatheelkunde, BGVH / Soci t  Belge de Chirurgie Vasculaire, SBCV*) conducts its scientific activities through different workgroups – either in the Dutch or French language, or both – focusing on all scientific and educational areas related to the discipline. All members are invited to the meetings organized by the national board of the BSVS and to the meetings organized by the board of the work groups as related to their language.

*Croatia.* In Croatia, the duration of vascular surgery training is 5 years and includes a variable common trunk period during which trainees can attend other surgical departments of their choice. An independent training program is recommended by the *Croatian Society for Vascular Surgery* which was founded in 1996. During the program, the vascular surgery resident acquires skills which are reported in a logbook and residents participate in surgical interventions alongside tutors. At the end of training, the resident must pass a national examination to be able to work as a specialist in vascular surgery.

*Egypt.* In Egypt, Vascular Surgery is considered an independent specialty represented since 2004 by the *Vascular Society of Egypt* founded by Emad Hussein. Total training duration is 5 years. No entry test is required but there are only 2 of 3 resident positions available per year.

Residents complete their common trunk in 2 years which includes initial general surgery training followed by a mandatory Master's degree in general surgery. The first 2 years are devoted to core surgical training with 3 additional years devoted to vascular surgery training.

A log book is kept for residents and the Tutor validates the book on number of performed procedures as 2nd or 1st Assistant, main surgeon supervised, main surgeon unsupervised, etc.

At the end of studies, there is no standardized national examination, but several universities give the vascular MD exam and only a few fellows can sit for the exam.

*France.* In France, vascular surgery is a monospecialty overseen by the French Society for Vascular and Endovascular Surgery (*Soci t  de Chirurgie Vasculaire et Endovasculaire de Langue Francaise*) (SCVE) founded in 1986.

During the 6th year of medicine school students have to take an entry test - the so called *Examen Classant National* - to start their specialty residency training the following year.

Those who wish to specialize in Vascular Surgery must contact either the Vascular Surgery Coordinator or the head of the Vascular Surgery college of the region in which they are located. The specialty lasts 5 years and includes mandatory rotation in the General Surgery and Emergency Departments.

A diploma in the specialty of vascular surgery is awarded by passing the DESC (Diploma of Complementary Specialized Studies) in Vascular Surgery at the end of the first year of post-traineeship. Passing the DESC requires possession of the DES (Diploma of Specialized Studies) in General Surgery, attending classes at the French College of Vascular Surgery, completion of at least 4 semesters in one or more validation departments during the period of internship and at least one year of post-internship.

The DESC in Vascular Surgery qualifies for enrollment in the National Order of Doctors which certifies doctors to practice the profession of vascular surgeon.

*Germany.* In Germany, vascular surgery is considered a monospecialty supervised by the German Society of Vascular Surgery and Medicine (DGG) founded in 1984.

No entry test is required and surgeons are directly hired by each hospital without an overall training scheme.

Residency lasts 6 years, 2 of which must be spent in a common trunk in General Surgery, the Emergency Department and the Intensive Care Unit.

Surgical education is recognized only by authorized surgeons (*Weiterbildungserm chtigte*). Training regulations (WBO) require that a specific number of procedures need to be completed by the end of the surgical training period. The requisite time, knowledge, and skills are documented in a logbook ("catalogue") that allows surgical trainees to record their operating experience by documenting the procedures they have performed.

Postgraduate training is not associated with universities and focuses almost entirely on work-based learning without formally taught courses.

Completion and signature of the principal tutor, who oversees the log book and the years dedicated is required in order to apply for the final oral exam and become a certified specialist in Vascular Surgery.

*Greece.* In Greece residency training and certification in Vascular Surgery are under governmental control: new graduates who want to participate in the postgraduate training of Vascular Surgery are put on a waiting list. The Minister of Health employs MDs for Vascular Surgery training throughout the whole of Greece and from these enlisted doctors the system recruits the trainees based upon chronological order and necessity.

Post-graduate training in Vascular Surgery lasts 7 years, 3 of which are as a mandatory Core Trainee (2 years of General Surgery + 6 months of Cardiothoracic Surgery + 6 months in Vascular ultrasound training).

During the training period, trainees are not allowed to act as principal surgeons unless they are assisted by a scrubbed trainer and therefore, they are not able to satisfy the type "C" indicator procedures required by the European Board of Surgery Qualifications in Vascular Surgery (EBSQ-VASC).

At the end of 7 years of Vascular Surgery training, trainees participate in a national examination organized 3 times a year by the Minister of Health. The trainees who pass are awarded the Vascular Surgery Specialty and can work as specialists. During the Vascular Surgery training period, each operation performed and skill acquired is reported in a logbook, but there is no minimum number of vascular operations required to sit for the national examination at the end of the 7-year period.

*Italy.* In Italy, Vascular Surgery became an independent branch of General Surgery in 1974, although the SICVE (Italian Society of Vascular and Endovascular Surgery) was founded in 1994.

After a national examination for access to specialty training, trainees undergo 5 years of education as resident in academic centers/university teaching and community hospitals. During the first year, residents rotate 3 months in Thoracic Surgery, 3 months in Cardiac Surgery and 6 months in General Surgery.

The training program is defined by the university and national health ministry and includes theoretical knowledge and development of practical, clinical and technical skills (open, endo, radiation safety, ultrasound, vascular medicine, etc).

Each activity is registered in a logbook. The school director or tutor validates the logbook regularly. Every year the resident takes an exam on vascular surgery and on subjects foreseen by the specialty board. Each year's assessment contributes to the final graduation grade. The final examination consists of oral discussion with the presentation of a degree thesis. Certification is issued by the resident's University.

*Lebanon.* In Lebanon it is necessary to complete 5 years of General Surgery residency in order to receive a Vascular Surgery fellowship which lasts for 2 years.

The scope of the vascular surgery fellowship is to cover all spectrums of vascular disease (arterial, venous, lymphatic), obtain good outpatient clinical

experience and inpatient management, Operating theater management commensurate with experience and case complexity with gradual increase in execution and autonomy.

The strengths of the fellowship program consist of solid experience in the management of the diabetic foot (including amputation above knee, below knee and transmetatarsal), creation of hemodialysis access, carotid endarterectomy, open aortic repair and EVAR/TEVAR, surgical and endovascular treatment of PAD, and treatment of varicose veins (RFA, EVLT, Stripping, Sclerotherapy).

Some of the self-perceived weaknesses consist of a limited experience with branched and fenestrated aortic grafts, carotid stenting and retrograde tibial or pedal access. The scientific updating of the residents foresees a weekly vascular conference and a monthly journal club.

The Lebanese fellowship training program in Vascular Surgery is comprised of a good balance of all the main clinical and academic components of modern vascular surgery:

- Non-invasive vascular testing with ultrasound-based therapeutics;
- Endovascular diagnostics and therapeutics;
- Open surgical procedures;
- Clinical research.

These activities are carried out at the American University of Beirut Medical Center (AUBMC) and its affiliated hospitals. At AUBMC, trainees are exposed to a wide variety of care-delivery systems and clinical practice structures.

The first-year trainee is involved in 5 main areas of activity:

- Endovascular Training;
- Noninvasive vascular laboratory;
- Vascular Medicine;
- Clinical research;
- Clinical activities (Open surgical procedures, outpatient clinic).

The second-year trainee is mainly involved in endovascular and clinical activities with an increasing focus on complex cases. All skills and performance are collected with a logbook and evaluated by the fellowship director and the vascular faculty.

*Portugal.* In Portugal Vascular Surgery has been an independent specialty since 1983, stemming from General Surgery; a status which was granted by the Portuguese Medical Association and endorsed by Ministry of Health. Vascular Surgery was initially part of the Cardiothoracic Vascular Society but became independent in 2000 (SPACV - Portuguese Society of Angiology and Vascular Surgery).

After a national examination (MCT) for Access to Specialty Training, trainees undergo 6 years of education, 1-year of basic training in General Surgery (surgical skills, exposure to common procedures, emergency surgery) and 5-years in specialized training in Vascular Surgery (open, endovascular, diagnostic techniques, angiology).

Trainees are provided with a logbook to collect procedures, publications and presentations. A minimum number of vascular operations are required and performed by the trainee as first operator. The number of operations as assistant operator is registered as well and is also considered for acceptance to the final examination. Interim in-house annual evaluations are given as part of the process of continuous evaluation and monitoring of the training process. The numbers must be officially confirmed by the Director of Vascular Service where training occurred.

A final examination takes place specifically not on the site of training with a Jury nominated by the College of Vascular Surgery. The examination consists of discussion of real clinical cases requiring the candidate's interview, a theoretical part plus *Curriculum Vitae* evaluation and discussion.

At the end of 6 years National Certification (CCT) is issued by the Portuguese Medical Association and officially endorsed by the Ministry of Health.

*Spain.* In Spain, Vascular Surgery has been an independent specialty since 1978, although the SEACV (*Spanish Society of Angiology and Vascular Surgery*) was founded back in 1959.

After passing a national examination for access to specialty training (admission according to the national score), trainees undergo 5 years of education, 1-year common trunk including 6 months of General Surgery, 1 month in ICU, 1 month in Interventional Radiology, 2 months in Cardiac Surgery and 2 months in Thoracic Surgery.

Trainees are provided with a logbook which is reviewed and assessed by the Tutor of Angiology and Vascular Surgery. A further assessment consisting of 12 elements relating to knowledge, skills and attitudes is completed by a corresponding specialist in all rotations and an annual evaluation is administered by the Angiology and Vascular Surgery Tutor.

A final examination is not on the site of training with a Jury nominated by the College of Vascular Surgery. The examination consists of discussion of real clinical cases requiring interviews with the candidate, a theoretical part, evaluation of the candidate's CV and discussion.

At the end of the 5 years no exam is required however National Certification (CCT) is issued by the Government and by the Minister of Health.

*Sweden.* In Sweden, Vascular Surgery is a branch specialty of General Surgery (SOSFS 2008:17) and is a monospecialty which has been represented since 2015 by the SSVS – *Svensk Förening för Kärlkirurgi / Swedish Society for Vascular Surgery*.

The so-called ST-läkare undertook training of residents before 2015. Back then, no minimum training time was specified but in order to meet the educational goals, residents had to complete 3–4 years of solely vascular surgery training.

After the 2015 reformation residents, directly hired by hospitals, spend a minimum of 5 years of training. At the end of this period no final examination is required but

residents are called to pass a national test after which they may decide to apply to the FEBVS.

The central government provides goal-oriented recommendations about the skills to be acquired through the National Board of Health and Welfare (open, endo, radiation safety, ultrasound, vascular medicine, etc). The goal description for Vascular Surgery contains a number of sub-goals. To achieve those goals, the logbook is constantly revised.

Six specific courses of vascular surgery (sub-goals C) + further compulsory courses in other disciplines (sub-goals A and B) are required. The common trunk lasts 1 year with rotations in ICU, emergency and trauma departments, in order to achieve sub-goals A and B.

Qualifications and certification are granted after evaluation of the resident's portfolio by an external examiner. Requests for additional documentation or training can be required. Goals are evaluated by an individual mentor and use of standardized skills evaluation forms and criteria.

*The Netherlands.* Although the NVvV – *de Nederlandse Vereniging voor Vaatchirurgie / Dutch Society for Vascular Surgery* was already founded in 1985, the specialty is considered a branch-specialty of general surgery. Through direct hiring admission, trainees undergo 6 years of education - 4 in general and 2 in vascular surgery - and rotate in both academic centers and community hospitals (years 1-2-3-6 in periphery, 4-5 in university medical centers) in Abdominal, Hepato-Pancreato-Biliary, Oncologic, Trauma and Paediatric Surgery. Even if this schedule is not fixed and depend on residences choice.

Training standards are clearly defined (SCHERP Procedures; CASH 1-2-3 Courses) and every key procedure is collected in a logbook. At the end of the training, the tutor evaluates how autonomous the trainee is in performing each procedure through a scoring system (A-E). This evaluation is then sent to the Dutch Association of Surgery to formalize that the training has ended. The logbook is fundamental in order to apply for the national examination. After successfully ending the 4 years of general surgery and 2 years of vascular surgery the candidate has 2 years time for the finale European exam (UEMS). If the number and diversity of procedures fulfils the requirements set by the Dutch Society of Vascular Surgery and the European Board of Vascular Surgery, automatic access to the UEMS is granted.

Nevertheless, variability also exists within the country, as in Maastricht trainees spend 6 years in Vascular Surgery only. Moreover, a reform of the educational pathway is under discussion and a 3 + 3 scheme (3 years in both General and Vascular Surgery) has been proposed.

## CONCLUSIONS

*What is the current situation?* Vascular Surgery is defined as the “clinical and scientific discipline concerned with the diagnosis, treatment and prevention of disease affecting arteries, veins and lymphatics, excluding vessels of the brain and the heart” and a vascular surgeon as “a specialist

in *Vascular sciences equipped to take responsibility for the complete management of patients with vascular disease*" (UEMS definition, section and board of Vascular Surgery). Vascular surgery is an integral part of a complex healthcare system as those of developed countries but since it is a relatively smaller specialty, its role and importance can be underestimated. A multitude of specialties require VS assistance to perform complex procedures in a safe manner and therefore its availability is critical to provide rapid intraoperative rescue of unintended haemorrhage or ischemia.<sup>3</sup>

In Europe, there are very different and heterogeneous levels of VS training in terms of professional development and educational programs. Some of the major disparities observed concern:

- Admission: direct recruitment, national exam, priority list
- General surgery training: from 6 months to 6 years
- VS training: 2–6 years
- Endovascular training: included in the curriculum (1-24 months)
- Subspecialty of General Surgery: Belgium, Netherlands, Ireland, Norway
- Training program accredited by: Vascular Society, Specialty Board, Government/Ministry of Health
- Board examination: National Vascular Society, Government, National Medical Society, University, National Board

*What are the critical issues?* Although VS may be considered a smaller specialty, the spectrum of disease under its competence is quite broad, covering from all arterial and venous diseases to fistula creation for dialysis, from orthopaedic, neurosurgical and oncological surgical assistance to surgical accesses for cardiac endovascular procedures (and repair of possible complications), from renal transplantation to trauma stabilization. Therefore, a vascular surgeon must be able to offer the correct treatment, chosen among open, endo and hybrid approaches, and tailor it to every patient.

Worldwide, VS is struggling to gain full recognition and space among other medical specialties which treat vessel diseases such as Interventional Cardiology, Cardiac Surgery, and Interventional Radiology.

### **Which may be the Best Strategies for Educational Improvement?**

- A common and shared "Content of Training", establishing theoretical knowledge and practical (clinical and technical) skills, for example, how many US scans? Angiography exams? Open/endo/hybrid procedures? and simulation training modules should be included within the curriculum.
- Quality assurance guidelines and requirements for Vascular Ultrasound
- Fundamentals of Radioprotection
- Competences regarding Professional Responsibilities, both to patients and society: disclosure of conflict of interest, disclosure of rate of complications and adverse

events, open/endo ratio, level of expertise on different procedures

- Homogenization of assessment during the training period (ability to perform different procedures, educational progression) and final exam (preparing trainees for FEBVS).

*What can we do?* To master both open and endovascular procedures, learning curves for trainees can be long and particularly hard if only carried out in the operating room. Simulation is an essential key tool to:

- learn technical skills
- develop competences, speed, efficiency, precision
- realistically practice endo and open procedures without direct risk to patients
- manage potential complications
- execute and retry different techniques outside the working time

Many types of simulators, from live animal models to box trainers, from cadavers to angiosuite simulators, etc. are nowadays produced but often their actual availability is mainly limited by costs and ethical issues, or a combination of the 2. Virtual reality and artificial intelligence may probably overcome some of these limits and be the true perspective towards a standardized evaluation of vascular trainees.<sup>4</sup>

*What can we expect for the future?* According to the CARE SPAN evaluation, vascular surgery will become the most in-demand specialty in the United States in terms of full-time physicians by 2025.<sup>5</sup> Given the similarity of epidemiological and healthcare evolution throughout developed countries, we can consider that this esteem may be valid for Europe as well. This prediction compels national governments and international organizations, through academic centres and teaching hospitals, to be ready to fulfil this demand. It is also fundamental that young surgeons are highly skilled, competent, and autonomous in performing open as well as endovascular or hybrid procedures.

Being called to respond to the constantly increasing demand of vascular treatments, the modern vascular surgeon cannot be a mere co-head physician, but a leader as well. To fulfil this responsibility such leadership requires:

- skills: to master and perform catheter intervention with the same ability as when performing open surgery;
- passion: having love for his or her specialty what he does;
- vision: to be able to predict the changes within the profession;
- service (spirit);
- optimism: as the treatment of vascular disease is tumultuously evolving, this change cannot be controlled but can somehow be oriented.
- Continual applied research
- Keeping abreast of new technologies

Being that a modern vascular surgeon has an impressive therapeutic armamentarium for addressing

vascular disease, it is an ethical imperative towards society that these tools are chosen wisely. A specific vascular problem may be treated with a variety of means, but it is up to the individual vascular surgeon to choose the optimal one by assessing the results that each is likely to produce.

Apart from being an excellent surgeon, physician and endovascular operator, the vascular surgeon must also be a manager and an economist ensuring that expertise and efforts expended bring about the best overall gain to the patient.

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