

# Analysis of the Greek Vascular Surgical Trainees' appreciation of e-Learning

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## Abstract:

**Introduction:** e-Learning (e-L) offers great market value and manifests an exponentially increasing global annual growth rate. Despite this growing demand for e-L material, the medical field appears to be left behind. The aim of this study is to examine the current role and potential future of e-L in the field of vascular surgery in Greece, as evaluated by the Greek vascular surgeons in training.

**Materials & Methods:** A questionnaire in Greek was prepared and emailed to all Greek vascular surgery trainees. The questionnaire was anonymized although participants were encouraged to share their details.

**Results:** Twenty trainees out of 35 (57.1%) participated in the survey. Participants demonstrated basic knowledge of what is e-L (85%), its advantages and disadvantages, and how e-L is delivered. Despite mediocre or non-existent prior experience to e-L, participants also reported that the future role of e-L is very important during or after the completion of their training in combination with traditional training. According to the surveyed trainees, the main advantages of vascular e-L are that it is available online for indefinite time (90%); it is not limited by geography (85%); no commuting is necessary (75%); and additional educational material is available through the course (65%). 45% believed that the major disadvantage of e-L is the isolation from the trainer while another 20% considered isolation from fellow trainees to be most important.

**Conclusions:** e-L for Greek vascular surgeons is still in its nascence, demonstrating both the great promise and the unsolved problems inherent in the early phase of a technology's growth. Greek trainees believe in the importance of the future role of e-L in their training.

## INTRODUCTION

e-Learning (e-L) and m-Learning (m-L) are two terms increasingly used in all aspects of education, training and continuous professional development. e- is the vocational education or training achieved by electronic means, while m- represents learning across multiple contexts using personal electronic devices.<sup>1</sup> These educational tools are distinct parts of Technology Enhanced Learning (TEL) as they both employ electronic means to provide education or training.<sup>2</sup> e-L offers great market value and manifests an exponentially increasing annual growth rate. Despite the growing global demand for e-L material, the medical field appears to be left behind, particularly in certain specialties and countries, although some examples of

successful e-L programs are currently available in some specialties.<sup>3-5</sup>

The aim of this study is to examine the current role and potential future of e-L in the field of vascular surgery in Greece, as evaluated by the Greek vascular surgeons in training.

## METHODS AND MATERIALS

A questionnaire in Greek was prepared by the two authors (Supplementary material #1 and #2). The questionnaire consisted of 19 questions divided in the following sections:

- Understanding of basic terms on e-L (Questions 1-2)
- Prior experience with e-L (Questions 3-8)
- Future views regarding e-L (Questions 9-13 and 18)
- Views regarding the organization of future e-L (Questions 14-17)
- Feasibility of learning a technical skill online (Question 19)

The link to the questionnaire was hosted using the online free service of Google Forms (Google LLC, USA).

The questionnaire was emailed to 35 vascular surgeons in training in all the Greek hospitals recognized as training centers. It was available online for a period of three weeks.

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The deadline for answering the questionnaire was March 13<sup>th</sup>, 2019. Anonymization was permitted as default, although trainees were encouraged to share their email address in order to receive feedback as well as the results of this online survey.

As per European Vascular Surgeons in Training (EVST) bylaws, trainees over the age of 40 and those who have completed their training but had not attempted the national board exam were excluded from the mailing list.

## RESULTS

### Understanding of basic terms on e-L

Twenty trainees (57.1%) participated in the survey by submitting the form. The majority of them (85%) answered that e-L is "vocational education or training achieved by electronic means (mainly via the Internet)", while 15% answered that e-L is "vocational education, training or training achieved delivered exclusively via the Internet".

In the question what constitutes e-L, all trainees (100%) replied online lessons, 35% answered lessons using a simulator, and 5% answered lessons in a classroom. Almost all trainees (n=19, 95%) thought that asynchronous lessons are part of e-L and 75% that synchronous lessons are part of e-L.

### Prior experience with e-L

Approximately two thirds of the trainees (60%) did not have prior experience with e-L and 90% did not have any prior experience with vascular surgery e-L.

On a scale from 1 (totally satisfactory) to 5 (totally disappointing), both prior experience with general and vascular surgery e-L received an average score of 2.5 (Figures 1 & 2). Eight people had prior experience with e-L in general, while only two had vascular surgery e-L experience.

Two thirds (65%) were aware that foreign educational institutions run e-L courses that lead to an official qualification in the form of a certificate or diploma.

Rate your prior experience with e-L: 1 - absolutely positive, 5 - absolutely negative

8 responses

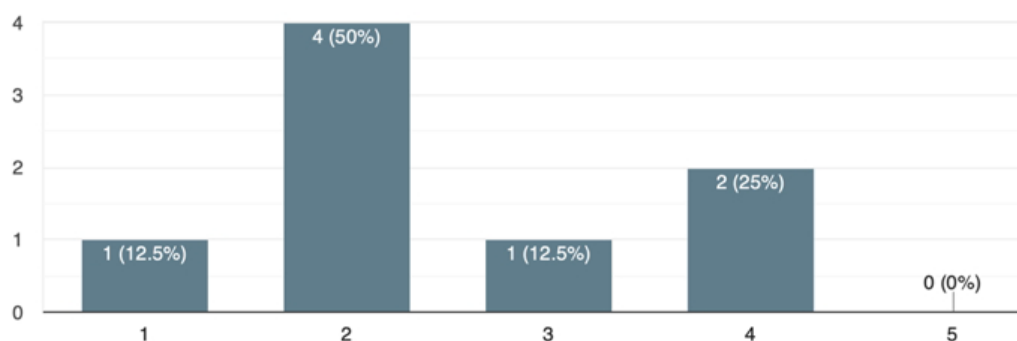


Figure 1. Ratings of previous e-L experience; 1 - absolutely positive, 5- absolutely negative

Rate your previous experience with vascular surgery e-L: 1 - absolutely positive, 5 - absolutely negative

2 responses

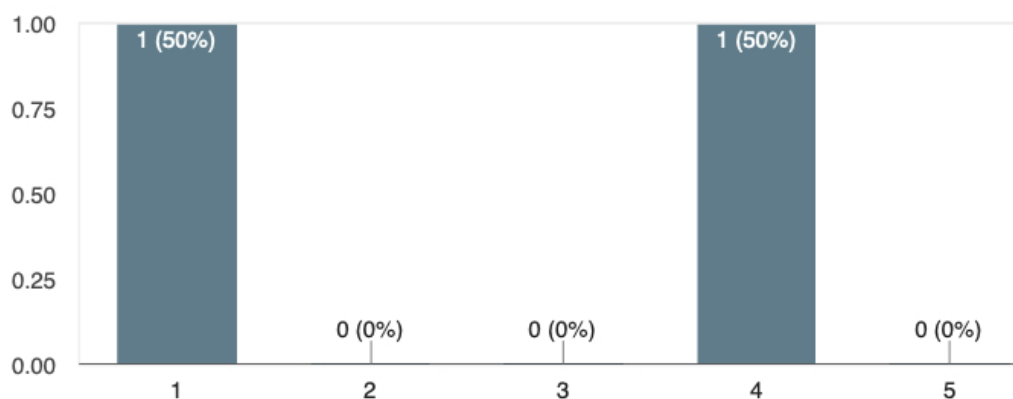


Figure 2. Ratings of previous vascular surgery e-L experience; 1 - absolutely positive, 5- absolutely negative

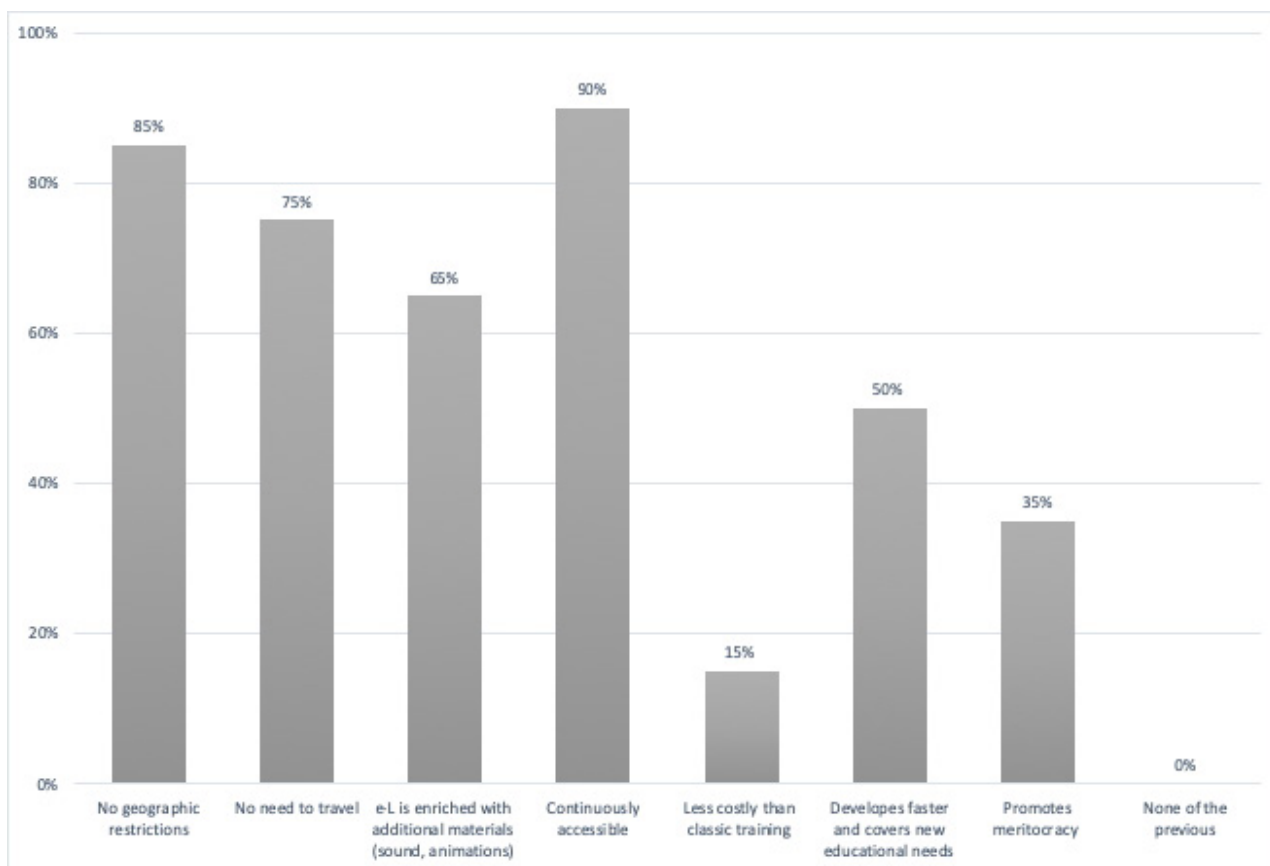


Figure 3. Advantages of e-L

#### Future views regarding e-L

All trainees (100%) believed that there is a place for e-L in future vascular surgery training.

According to the trainees, the main advantages of vascular e-L are that it is available online for indefinite time (90%); it is not limited by geography (85%); no commuting is necessary (75%); and additional educational material is available through the course (65%) (Figure 3).

Approximately half of the trainees (45%) believed that the major disadvantage of e-L is the isolation from the trainer while another 20% considered isolation from fellow trainees to be the most important disadvantage (Figure 4).

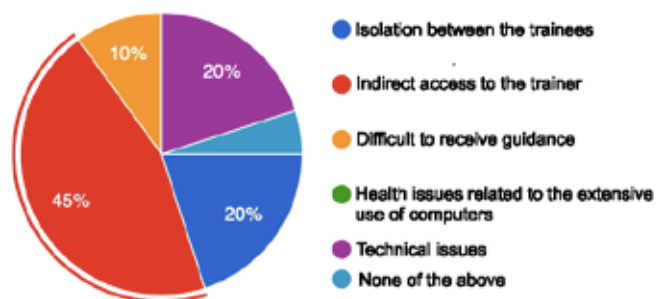


Figure 4. Disadvantages of e-L

All trainees (100%) believed that vascular surgery e-L would benefit both the surgeons in training and the post-training vascular surgeons.

Depending on the subject to be taught, all trainees (100%) favored the use of classical training and e-L in combination as their ideal learning modality.

#### Views regarding the organization of future e-L

All trainees desired that the vascular community should invest in developing an e-L program and 70% considered that this program should be developed by the surgical societies (Figure 5).

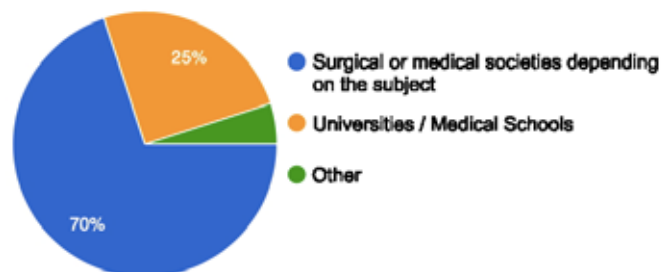


Figure 5. Who should develop a vascular surgery e-L project?

Regarding the financial burden of developing an e-L program for vascular surgeons and surgeons in training, opinions were divided (Figure 6). One third (35%) of the trainees believed that trainees should have access for free while post-training colleagues should pay a fee. Approximately the same percentage of trainees (30%) considered that the development should be financed by private companies that will advertise their products in adherence with the ethical guidelines for medical advertisement.



Figure 6. Who should cover the cost of an e-L project?

All trainees (100%) believed that e-L will play a significant role in vascular surgery in the future.

#### Feasibility of learning a technical skill online

Finally, 70% of the trainees considered it feasible to learn a practical skill online, while 25% agreed that it is feasible only for carefully selected subjects.

## DISCUSSION

TEL consists of e-L, m-L, simulator-based training and the latest addition, cloud-based learning or c-L.<sup>6</sup> Despite all of the above terms being increasingly utilized in medical and surgical specialties, the most frequent term that physicians recognize is e-L. It is not surprising that employees in all fields, including healthcare providers, are becoming more familiar with e-L. The global expenditure for e-L projects reached USD 51.5 billion in 2016; this field has been growing by a steady annual rate of 7.9% since 2012.<sup>7</sup> This progress in e-L consumption is led mainly by less developed countries.<sup>7</sup>

The aim of this study is to examine the current role and potential future of e-L in the field of vascular surgery in Greece, as evaluated by the Greek vascular surgeons in training. The number of vascular surgeons in training in Greece is 35, rather low compared to larger first world countries, with mixed impact upon this study. A benefit of this limited population is obtaining questionnaire responses from twenty participants (57.1%) provides a sample size large enough to provide valid data representing the whole group of trainees. On the other hand, the limited number of participants negatively affects our ability to apply definitive conclusions to any larger cohort of trainees (e.g. all EVST members). The latter statement is further affected by the fact that this study is limited to Greece, a country superior only to Romania amongst the European Union (EU) countries based on the 2018 Digital Economy and Society Index (DESI).<sup>8</sup> Despite the comparably high expenditure of Greece on educational institutions of all levels, this country seems to spend less on e-L than other EU

countries with similar characteristics, e.g. Slovakia or Estonia, two other small EU countries with their distinct languages, but with a significant rate of growth in their TEL sector.<sup>7</sup> Therefore, the size of Greece and the small number of Greek speakers (compared to e.g. English or German) may not be the reasons behind the lack of a significant e-L investment and growth. Of course, Greek vascular surgeons and trainees are a very small group within a small country and the limited number of potential users of a dedicated vascular e-L program makes the initial investment cost-prohibitive. Possible solutions to reduce the financial burden of building a vascular e-L project would be to either build e-L materials that could be reemployed without any or with a few changes, or host the vascular e-L project within a larger institution or company that manages a significant number of other e-L programs splitting costs between all users. Although the overall efficacy and effectiveness of e-L are already well established, the related cost-effectiveness is still under debate and should be further supported by further evidence.<sup>9</sup>

Although a number of different definitions for e-L exist, a widely accepted definition is “*vocational education or training achieved by electronic means (mainly via the Internet)*”. The majority of participants chose this definition as the right one, while the remainder chose a slightly narrower definition- “*vocational education, training or training achieved delivered exclusively via the Internet*”. Therefore, all the participants recognized what e-L is, a positive finding as it demonstrates that all participants possessed the most basic knowledge regarding e-L. It should be noted the e-L is not only provided via the internet but it can also be provided through a local network (e.g. workplace or hospital) or a dedicated wider network (e.g. university).

e-L can be provided in an asynchronous or synchronous format. Asynchronous learning occurs when the trainer produces and trainees attend at different time points (e.g. online video course continuously available), while synchronous is when the trainer produces and trainees attend simultaneously (e.g. live video class). Most of the participants answered that asynchronous and synchronous are both formats of e-L (95% and 75%, respectively). Therefore, participants are aware of the two different formats. All participants correctly chose that online courses are examples of e-L. A third of them (35%) considered simulator-based training as part of e-L, which is not the case, although simulators are part of TEL. Only one participant considered that lessons in a class are an example of e-L, something that could be true if an electronic method of delivering the material was used. An example of that would be a recorded video lecture delivered through the internet to a remote class while the trainer accepts questions from the trainees in a live chat feed.

Many of the participants did not have a previous experience of e-L (60%) and almost all of them (90%) did not have any previous experience with vascular surgery e-L. These results came to the authors' surprise, as the European Society for Vascular Surgery (ESVS) was the first to build e-L materials aiming in the education and training of both specialists and trainees.<sup>6,10</sup> Apart from ESVS, other platforms also exist and provide e-L materials. The fact that Greek trainees did not participate to any e-L activity could be the result of a language

barrier and/or poor advertising of the e-L courses in Greece. Two thirds (65%) of the Greek trainees knew that respected foreign academic institutions offer e-L courses leading to certified qualifications, therefore advertising could be considered sufficient regarding other fields, but not regarding vascular surgery. The underlying reasons behind these findings should be further examined. Participants who had e-L experience, rated their prior general and vascular learning as mediocre (score 2.5).

All participants considered that there is a place for e-L in vascular surgery. Participants recognized the benefits of e-L to be the absence of geographical restrictions (85%); elimination of the need for travel (75%); the ready availability of further educational material (65%); the constant accessibility of asynchronous e-L (90%); and the promotion of meritocracy as e-L training materials and assessment are not training center-dependent. These advantages of e-L are well recognized.<sup>6,11</sup>

The disadvantages of e-L are also well described by the participants of this study. Approximately half the participants (45%) believe that not having immediate access to the trainer is a major disadvantage. An online forum, live chat or even the availability of scheduled online meetings could resolve this issue, as well as the other major disadvantage of e-L identified by trainees, namely, their isolation from other learners. Technical issues are also considered a major stumbling block to successful e-L and these could be avoided by providing cross-platform solutions using common standards and protocols such as HTML5 and TCP, respectively.

All participants consider that specialists in vascular surgery would benefit from continuous professional development based on e-L. They also believe that trainees will further develop and improve through the use of e-L programs. All participants consider that classic training and e-L should be combined, depending on the study material and that the Greek vascular society should invest in e-L training. From these results, it is obvious that Greek trainees strongly believe that there is a future place of e-L in both their training and their post-training development. This is also further supported by the answer to the specific question in this regard (see supplementary material). Depending on the training focal point, either classic or e-L training could be used, which echoes the findings of several meta-analyses demonstrating that e-L is not inferior to traditional medical training.<sup>12,13</sup>

The majority of participants (70%) believe that surgical societies should be responsible for developing e-L and one out of five participants (20%) considers that medical schools should develop e-L. This is an dilemma still vexing the majority of the researchers on e-L in medicine and a recent meta-analysis of available resources has not provided a valid answer.<sup>12</sup>

The cost of e-L programs should not burden the trainees (80%), as it should be alleviated by either the surgical societies (15%), sponsors (35%) or partly by the specialist vascular surgeons (30%). In order for an e-L program to be cost effective, a prior market needs assessment should be performed and the e-L program must have a clear focus, a specific target group and clear criteria for assessing the results. In the past, the

ESVS e-L team had successfully run a number of different e-L programs that all received >70% satisfaction rate by the trainees who used them.<sup>6,10</sup> Most of these projects were cost-effective as a result of assessing the needs of the target group prior to launching them, a method that contributed to wide participation. The human and material resources required for creating an e-L curriculum are substantial, but these costs are recouped by the ability to host subsequent instalments of the e-L program with fractional further investment.

The final question of the survey was whether a practical (surgical) skill can be taught online. The e-L team of the ESVS explored the application of e-L to the skill of sizing and planning of aortic aneurysm repair with a fully online course based on an open source reconstruction software program that received a high satisfaction score (>70%) from participants.<sup>6,10</sup> In this course, the practical skill was successfully assessed and officially certified by the ESVS, with the caveat that the skill level could not be quantified. This ESVS experience provides a basis for stating that a practical skill can be taught online; this sentiment is further supported by other publications.<sup>14</sup> Limitations exist depending on the practical skill in question, as some skills seem to be easier than others to be taught online.

Other vascular e-L programs, similar to the one previously ran by the ESVS, have been now undergone a radical change on the way they are developed and delivered.<sup>15</sup> Examples of successful vascular e-L programs are been developed by parties not related to official vascular societies, such as groups of health professionals<sup>16,17</sup> or institutions<sup>18</sup>.

Since resources are limited and the potential audience is rather limited, a vascular e-L program could be developed and deployed only after a needs analysis is performed and clear educational goals are set. The needs analysis would ideally identify the cohort of vascular professionals that would mainly benefit from an e-L program and what material is necessary to meet the needs of these professionals. Further development would be based on this initial project and the by-then already existing educational platform, reducing further costs and making the Greek vascular e-L program cost-effective and efficient in reaching its aims.

## CONCLUSION

e-L for Greek vascular surgeons is still in its nascence, demonstrating both the great promise and the unsolved problems inherent in the early phase of a technology's growth. Although its technical feasibility is continuously gathering supporting data and its results are already described as non-inferior to traditional training, there is still a long way to go before we integrate surgical e-L into our current curricula. Greek trainees demonstrate basic knowledge and understanding of key e-L concepts and believe in the future role of e-L in their training.

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*Potential conflicts of interest:*

- VZ is the Representative Greece to EVST
- NP is the Honorary Representative Greece to EVST
- SM and NP were members of the ESVS e-Learning team



## REFERENCES

- 1 Crompton H. A Historical Overview of M-Learning: Toward Learner-Centered Education. In: *Handbook of Mobile Learning*. Routledge; 2013:41-52
- 2 Patelis N, Matheiken SJ, Beard JD. The Challenges of Developing Distance Learning for Surgeons. *European Journal of Vascular & Endovascular Surgery*. 2015;49(3):237-238
- 3 Chhetri SK. E-learning in neurology education: Principles, opportunities and challenges in combating neurophobia. *J Clin Neurosci*. 2017;44:80-83
- 4 Lerner SF, Mansouri K, Lin SC. Glaucoma in the Age of E-Learning. *J Glaucoma*. 2019;28(5):367
- 5 Moreira IC, Ramos I, Rua Ventura S, Pereira Rodrigues P. Learner's perception, knowledge and behaviour assessment within a breast imaging E-Learning course for radiographers. *Eur J Radiol*. 2019;111:47-55
- 6 Patelis N, Matheiken SJ, Beard JD. The challenges of developing distance learning for surgeons. *Eur J Vasc Endovasc Surg*. 2015;49(3):237-238
- 7 Panagiotaropoulou S, Basat A, Piccioli V, Hauser B, Bui S. E-Learning Market Trends & Forecast 2014 -2016 Report. [https://www.academia.edu/31610714/E-Learning\\_Market\\_Trends\\_and\\_Forecast\\_2014\\_-2016\\_Report](https://www.academia.edu/31610714/E-Learning_Market_Trends_and_Forecast_2014_-2016_Report). Published 2014. Accessed 4/13/2019
- 8 The Digital Economy and Society Index (DESI). European Commission. <https://ec.europa.eu/digital-single-market/en/desi>. Published 2018. Accessed 4/13/2019
- 9 George PP, Papachristou N, Belisario JM, et al. Online eLearning for undergraduates in health professions: A systematic review of the impact on knowledge, skills, attitudes and satisfaction. *J Glob Health*. 2014;4(1):010406
- 10 Patelis N. Challenges in vascular surgery e-learning. Paper presented at: 18th Panhellenic Congress of Angiology, Vascular & Endovascular Surgery. 2019; Athens, Greece
- 11 Benefits of an e-learning module. *Br J Nurs*. 2015;24(14 Suppl):S18
- 12 Vaona A, Banzi R, Kwag KH, et al. E-learning for health professionals. *Cochrane Database Syst Rev*. 2018;1:CD011736
- 13 Maertens H, Madani A, Landry T, Vermassen F, Van Herzeele I, Aggarwal R. Systematic review of e-learning for surgical training. *Br J Surg*. 2016;103(11):1428-1437
- 14 Buch SV, Treschow FP, Svendsen JB, Worm BS. Video- or text-based e-learning when teaching clinical procedures? A randomized controlled trial. *Adv Med Educ Pract*. 2014;5:257-262
- 15 European Society for Vascular Surgery. M@sterclass. <https://masterclass.esvs.org>. Accessed 5/12/2019
- 16 Vascupedia team. <https://vascupedia.com>. Accessed 12/5/2019
- 17 Radiopaedia team. <https://radiopaedia.org/encyclopedia/all/vascular?lang=us>. Accessed 5/12/2019
- 18 University of Edinburgh. ChM in Vascular & Endovascular. <https://www.edinburghsurgeryonline.com/courses/chm-vascular-endovascular>. Accessed 5/12/2019