



## Optimizing engagement of undergraduate students in medical education research: The eMERG training network



Michail Sideris<sup>a,b,\*,1</sup>, John Hanrahan<sup>a,c,1</sup>, Nikolaos Staikoglou<sup>a,d</sup>, Panteleimon Pantelidis<sup>a,d</sup>,  
Connie Pidgeon<sup>a,e</sup>, Nikolaos Psychalakis<sup>a,f</sup>, Nikolai Andersen<sup>a,g</sup>, Theodore Pittaras<sup>a,h</sup>,  
Thanos Athanasiou<sup>a,i</sup>, Georgios Tsoulfas<sup>a,d</sup>, Apostolos Papalois<sup>a,f</sup>

<sup>a</sup> *esmsc Medical Education Research Group (eMERG Collaboration), Experimental Research Center ELPEN, Greece*

<sup>b</sup> *Queen Mary University of London, Yvonne Carter Building, London E1 2AB, United Kingdom*

<sup>c</sup> *King's College London, Faculty of Life Sciences and Medicine, Strand, London WC2R 2LS, United Kingdom*

<sup>d</sup> *Aristotle University of Thessaloniki, Thessaloniki 541 24, Greece*

<sup>e</sup> *Royal London Hospital, Bartshealth NHS Trust, United Kingdom*

<sup>f</sup> *Experimental Research Centre ELPEN, Athens, Greece*

<sup>g</sup> *PPA-International Medical, Denmark*

<sup>h</sup> *National and Kapodistrian University of Athens, Athens, 115 27, Greece*

<sup>i</sup> *Imperial College London, London SW7 2AZ, United Kingdom*

### ARTICLE INFO

#### Keywords:

Medical education  
ESMSC  
Undergraduate surgical education  
Research network  
eMERG

### ABSTRACT

**Background:** The practice of evidence-based medicine and critical appraisal are essential for the modern doctor. Early engagement of medical students in research methodology is considered as a rising need for most medical school curricula; however, few peer-reviewed initiatives have been reported so far. We developed a Medical Education Research Group (eMERG) as part of a novel undergraduate surgical masterclass, which aimed to train undergraduate students on basic research methodology, as well as to motivate them to pursue a clinical and academic career in surgical specialties.

**Methods:** eMERG consists of an international structured network of senior academics, consultant-level clinicians, senior and junior trainees who support undergraduate trainees. Students are selected from a competitive pool of applicants. Several small prospective studies in skills-based education, as well as systematic reviews on similar topics, have run under the umbrella of this framework, in the form of scholarship awards. Structured feedback questionnaires were distributed to evaluate the experience of the first three years.

**Results:** 12 students have participated in this pilot initiative. 11 manuscripts have been submitted for publication and 8 were accepted following peer-review in MEDLINE-indexed journals. Delegates perceived this experience as an excellent training opportunity which improved their research productivity. Delegates also stated engagement in research developed interest in the relevant surgical speciality, impacting their career aspirations.

**Conclusions:** eMERG is one of the first reported European educational research networks for undergraduates. Research outcomes and students' perceptions conclude that eMERG enhances engagement with research methodology and motivation towards a career in surgery.

### 1. Introduction

Understanding research methodology is becoming an essential prerequisite for future physicians. In the United Kingdom (UK), more than a third of medical students undertake an intercalated Bachelor of Science (iBSc) degree [1]. iBSc's role in Medical Curricula is primarily to introduce undergraduate students to research, involving them directly in projects, and increase their motivation towards a clinical and

academic career [2]. Apart from iBSc, several medical schools offer additional options, including intercalated Master of Science (MSc), Master of Research (MRes) or PhD [3]. Besides formal research involvement as part of those degrees, an increasing number of students decide to engage in research further, seeking to undertake research projects that run concurrently to their clinical placement [4].

Despite the overall increasing trend of engagement with research at the undergraduate level, there is still lack of fundamental infrastructure

\* Corresponding author. Women's Health Research Unit, Queen Mary University of London (QMUL), Yvonne Carter Building, 58 Turner Street, E1 2AB, London, United Kingdom.  
E-mail address: [m.sideris@qmul.ac.uk](mailto:m.sideris@qmul.ac.uk) (M. Sideris).

<sup>1</sup> Equal contributors.



Fig. 1. eMERG logo.

to support students, or even young trainees, naïve to academia [5]. Additionally, although medical education recipients are primarily undergraduate students, little effort has been made to engage them with research opportunities relevant to this topic.

To address the gap in terms of a formal supporting mechanism for research in undergraduate medical education, we founded a pilot research training network. This collaboration network aims to provide a supporting umbrella and enhance training opportunities for undergraduate students who are interested in medical education; and secondarily to motivate them to engage with research at the earliest stage.

## 2. Methods

ESMSC Medical Education Group (eMERG) is an international collaboration between senior academics, consultant-level physicians, senior and junior trainees with undergraduate medical students (Fig. 1). It was founded as part of the “Essential Skills in the Management of Surgical Cases (ESMSC Marathon Course), which is an international multidisciplinary undergraduate surgical masterclass [6,7]. ESMSC recruits motivated undergraduate students from various countries of the European Union (EU). Its current curriculum combines high and low fidelity simulation-based learning modules, with case-based discussions, non-technical skills and basic science workshops.

Students who have successfully completed the course are invited to submit a 300-word statement on their future vision about and their expectations from eMERG, along with their cv. Faculty selection committee (FSC) invites shortlisted delegates for a structured interview which aims to explore students' aspirations for research involvement. Interview panel consists of project leads (MS, AP) along with senior academics that support ESMSC project. Successful applicants receive an “eMERG award” in the form of scholarship supported by a research grant from Experimental Research Centre ELPEN (ERC ELPEN). Similarly, FSC invites senior and junior trainees who have been faculty members of the course and hold previous research experience to attend a similar interview [7].

eMERG is based on a multilinear chain logic (Fig. 2), where one or more students are paired with 1 or 2 junior-level trainees and 1 or 2 senior academics or consultants. Students receive guidance on designing and running a research project as part of the course (prospective observational studies); alternatively, they can be involved in a systematic review, the research question of which lies within the medical education field. Projects' set-up in most cases has been conceived by ESMSC leads (MS/AP) in the case of prospective studies; or from various senior academics who work in close collaboration (TA/AP) in the case of systematic reviews. Students are encouraged to submit their own research proposals in certain general topics (Fig. 2). All eMERG participants receive direct individualized supervision from allocated supervisors and the junior lead of the project (MS). Scheduled joint meetings with ESMSC leads (MS/AP) and the senior authors' team allow resolution of any potential conflicts or challenges.

Following a pilot 2-year application of the eMERG collaboration, we invited selected students to attend a structured interview and discussed

their feedback and vision about this initiative.

## 3. Results

From a pool of 45 eligible applications, 12 students were selected to be part of the pilot eMERG concept. Objective research outcomes include 8 published papers [6–13] and 3 submitted in MEDLINE indexed journals. 5 oral presentations were also accepted in US and European international conferences. Students perceived eMERG as a successful training initiative in research methodology, which increases motivation towards a clinical and academic career in various surgical specialties. Rising number of applications during last semester i. e 35 eligible applications between April–November 2017 vs. 10 prior to this (December 2015–April 2017) reflects students' increasing interest to engage with eMERG.

## 4. Discussion

Rapid evolution of clinical practice based on continuous novel research outcomes implies a fundamental need for early involvement in research, as well as robust understanding of its methodology [14]. Additionally, austerity measures have affected healthcare systems and led to overworked physicians with increasing burnout rates [7,15]. Research opportunities and education quality are traditionally the easiest victims of financial implications. Therefore, attrition rates have climbed to record numbers, with several acute specialties suffering from recruitment issues [15–17]. In this context, medical education and modern curricula should be conceptually reformed to meet future demands, and in the same time enhance motivation of future physicians to increase workforce retention [18].

A similar effort, focused on residents in training has been reported in 2015 [19] from University of Michigan. The authors recognize three key success components; the clear provision of mentorship both by seniors as well as by peer colleagues, effective teamwork in a supported framework and the identification of education gaps which generates questions for future research. The MERG group consists of medical students, residents and fellows who are passionate to work as part of an educational scholarship.

Further to this, Association of American Medical Colleges (AAMC) have introduced a Medical Education Research Certificate (MERC) [20]. MERC aims to build a robust understanding of the processes involved in medical education research, and is specifically targeted to clinicians and educators to enable collaborative participation in relevant projects.

In our case, we describe one of the first undergraduate multi-specialty research training collaborations, targeted again on medical education and mainly simulation-based learning for surgical specialties. Besides formal curricular opportunities to engage with research, there is a fundamental gap in current evidence on supporting undergraduate students in their research aspirations [21,22]. Additionally, there has been an increasing number of students' societies trying to systematize a basic infrastructure to provide research opportunities. This reflects a recognized demand to set up formal networks which can potentially provide protected opportunities to motivated students across several universities [21,23]. Additionally, as a result of the network-character component, these opportunities can enhance interaction and exchangeability of research methodology. In the case of eMERG, the concept to focus on medical education highlights and implies the need for a collaboration with international character.

Connecting clinicians and students from various training levels combines the peer-to-peer learning strategy with the conventional hierarchy-based teaching approach, between senior academics and fellow members. This unique concept resolves traditional stereotypes such as professor-led (or senior academic) research and develops a bridge between senior & junior researchers with medical students [24,25]. As a result, undergraduate students feel more engaged and

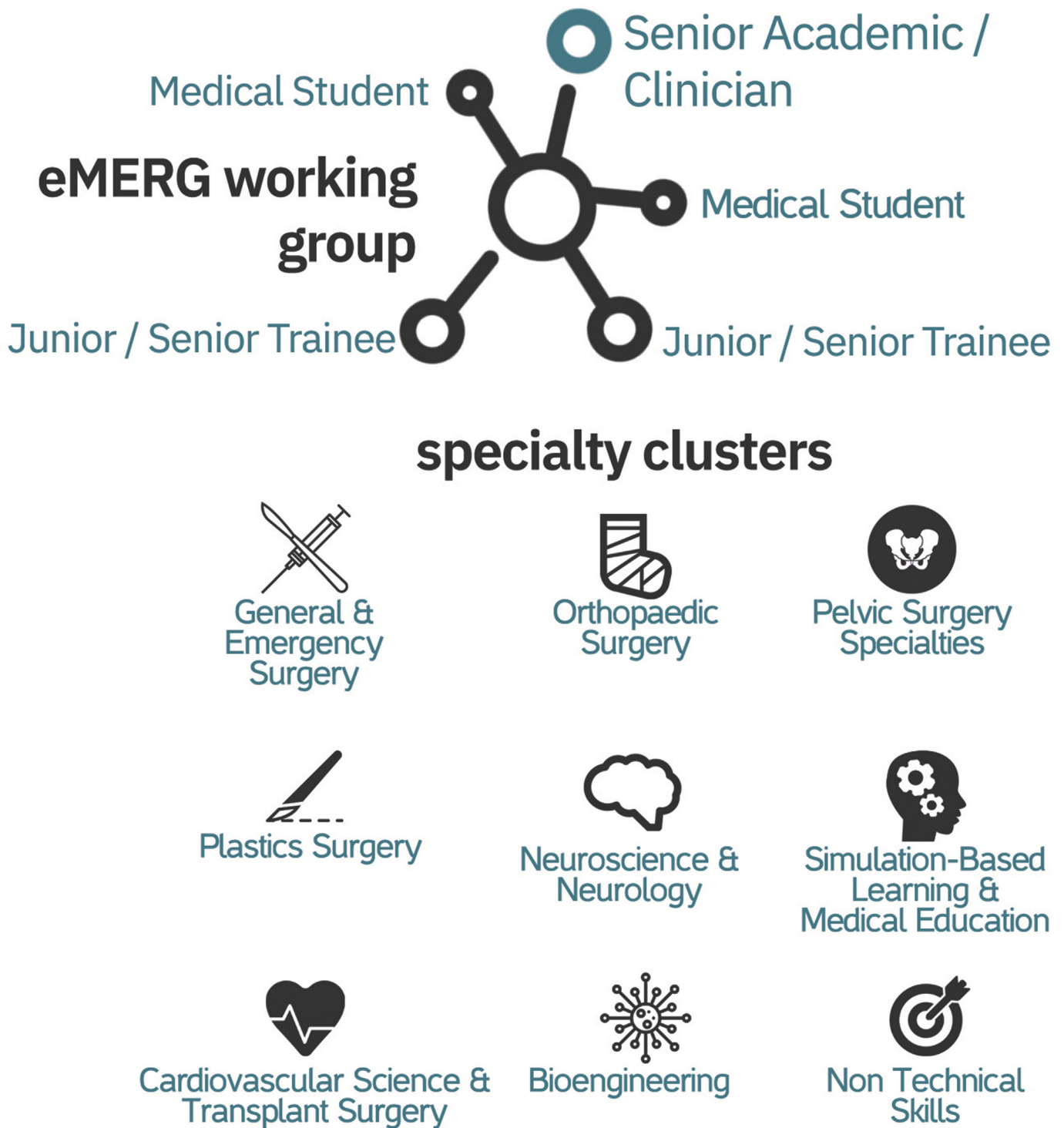


Fig. 2. Structure of eMERG working groups. The letter “G” in the logo represent the multilinear structure logic of the group.

motivated to be part of research; and this can inspire confidence on them to develop and support their own novel ideas [26]. This was reflected as an overall conclusion of the feedback received from the structured interviews.

Providing a formal framework for students to support their own ideas can foster career development through multiple facets. Problem-solving is one of the skills that can be indirectly enhanced, as students have the autonomy and flexibility to refine their project-approach in line with challenges that arise throughout [27]. Additionally, this develops another fundamental skill which is found in successful

researchers: leadership [23]. eMERG fosters a culture of adaptive learning tailored to the undergraduate level for each research project. It also promotes a student-led problem-solving approach upheld by a collaborative network which provides a supporting infrastructure to achieve research training with successful outcomes. Overall, this can inspire a leadership culture from the undergraduate level with emphasis on achieving fundamental development of multiple soft-skills, required to be a successful future researcher and clinician.

An important note related to our initiative is the financial circumstances on which both ESMSC and eMERG have been set up. Despite

global crisis and continuous economic recessions, we managed to structure an initiative with acceptable outcomes, without transferring any cost to the student [7].

eMERG's foundation is set around an internationally accredited surgical masterclass (esmsc) which brings together a large network of academics, qualified clinicians and trainees. In summary, the key difference from self-motivated research is that eMERG provides a structured framework which can train students in research methodology. At the same time, its international foundation promotes diversity and exchangeability of knowledge.

#### 4.1. Limitations

However, we recognize a series of limitations; firstly, the limited numbers of students that have been part of eMERG are strongly motivated individuals who would anyhow seek to pursue extracurricular opportunities. Secondly, eMERG has focused primarily on medical education research and more specifically on SBL strategies. Also, we can only base our conclusions on limited data from research outcomes, as well as students' subjective feedback on their experience. Finally, this is a pilot implementation from a two-year window which can introduce severe bias on future developmental goals.

#### 4.2. Future aspirations

eMERG is planning to expand its collaboration between researchers across the EU and the US. The primary focus of our research will be to identify all fundamental skills required at the undergraduate level for most of the surgical specialties; whilst simultaneously developing core performance outcomes to objectively assess them using evidence synthesis methodology. This will be the foundation, as well as the main evolving mechanism, of the newly introduced course curriculum (integrated generation 4 – iG4) [7]. We will also promote participation of students from deprived areas of the world who have limited opportunities.

### 5. Conclusions

eMERG is one of the first research training networks for undergraduates which allows robust engagement of delegates with various medical education projects. Its structure can serve as a novel model to convey research experience from one generation to another, motivate students to engage in research and aspire to develop leadership skills. Although newly introduced, our outputs indicate that eMERG meets its initial targets, and in the same time it allows collateral development of various soft skills including decision making and problem solving. Although we plan expansion of eMERG, our primary challenge will be to secure funding to allow engagement of more students globally.

#### Ethical approval

ESMSC licence (ethical approval) met directive 63/2010, PD 56/ April 2013 declaration, according to local policy. The license reference number is 884 28/4/2015.

#### Sources of funding

eMERG is supported by a research grant from the Experimental Research Centre ELPEN. This grant is used to support students from various universities with dedicated scholarships.

#### Author contribution

MS and JH have equal contribution and drafted the manuscript. GT edited part of the manuscript and had lead role in the ESMSC course. MS and AP are the ESMSC leads and conceived the idea of eMERG. JH is

the lead coordinator of the eMERG research network. CP, NA NS and NA have contributed in most of the series of experiments throughout ESMSC courses. TA and TP are a senior Academics with input in several projects of the eMERG collaboration. NS and PP have contributed in several eMERG projects; they are also part of the administration team for the course and the research network.

#### Conflicts of interest

No conflict of interest.

#### Registration of research number

NA.

#### Guarantor

Michail Sideris and Apostolos Papalois are guarantors of this work.

#### Consent

NA.

#### References

- [1] O.A. Jamall, et al., When should undergraduate medical students do an intercalated BSc? *Med. Educ. Online* 20 (2015) 30599.
- [2] M. Jones, et al., Impact of an intercalated BSc on medical student performance and careers: a BEME systematic review: BEME Guide No. 28, *Med. Teach.* 35 (10) (2013) e1493–e1510.
- [3] M. Saleh, D. Weinberg, Y. Sinha, Innovative intercalated degrees at a modern medical school in the United Kingdom, *Med. Teach.* 36 (2) (2014) 180.
- [4] R. Moller, M. Shoshan, K. Heikkila, What is the reward? Medical students' learning and personal development during a research project course, *Med. Educ. Online* 20 (2015) 28441.
- [5] Collaborative, S.T., Medical research and audit skills training for undergraduates: an international analysis and student-focused needs assessment, *Postgrad. Med.* 94 (1107) (2018) 37–42.
- [6] M. Sideris, et al., Developing an international combined applied surgical science and wet lab simulation course as an undergraduate teaching model, *BioMed Res. Int.* 2015 (2015) 463987.
- [7] M. Sideris, et al., Developing a novel international undergraduate surgical masterclass during a financial crisis: our 4-year experience, *Postgrad. Med. J.* 94 (1111) (2018 May) 263–269 <http://dx.doi.org/10.1136/postgradmedj-2017-135479>.
- [8] M.C. Sideris, et al., Evaluating the educational environment of an international animal model-based wet lab course for undergraduate students, *Ann Med Surg (Lond)* 12 (2016) 8–17.
- [9] M. Sideris, et al., Introducing in vivo dissection modules for undergraduate level trainees: what is the actual benefit and how could we make it more efficient? *Indian J. Surg.* 80 (1) (2016).
- [10] M. Sideris, et al., Promoting undergraduate surgical education: current evidence and students' views on esmsc international wet lab course, *J. Invest. Surg.* 30 (2) (2017) 71–77.
- [11] F. Dhaif, et al., The role of anxiety in simulation-based dexterity and overall performance: does it really matter? *J. Invest. Surg.* (2017) 1–6.
- [12] I. Theodoulou, et al., Simulation-based learning Strategies to teach undergraduate students basic surgical skills: a systematic review, *J. Surg. Educ.* (2018 Feb 16), <http://dx.doi.org/10.1016/j.jsurg.2018.01.013> pii: S1931-7204(17)30587-1. [Epub ahead of print].
- [13] P. Pantelidis, et al., Is In-Vivo laparoscopic simulation learning a step forward in the Undergraduate Surgical Education? *Ann Med Surg (Lond)* 16 (2017) 52–56.
- [14] M. Mylopoulos, K. Kulasegaram, N.N. Woods, Developing the experts we need: fostering adaptive expertise through education, *J. Eval. Clin. Pract.* (2018 Mar 8), <http://dx.doi.org/10.1111/jep.12905> [Epub ahead of print].
- [15] T. Correia, et al., The effects of austerity measures on quality of healthcare services: a national survey of physicians in the public and private sectors in Portugal, *Hum. Resour. Health* 15 (1) (2017) 82.
- [16] A. Amutio, et al., Acceptability and effectiveness of a long-term educational intervention to reduce physicians' stress-related conditions, *J. Continuing Educ. Health Prof.* 35 (4) (2015) 255–260.
- [17] S. Castro Lopes, et al., A rapid review of the rate of attrition from the health workforce, *Hum. Resour. Health* 15 (1) (2017) 21.
- [18] M. Al-Shamsi, Addressing the physicians' shortage in developing countries by accelerating and reforming the medical education: is it possible? *J Adv Med Educ Prof* 5 (4) (2017) 210–219.
- [19] M. Perry, et al., Model for developing educational research productivity: the medical education research group, *West. J. Emerg. Med.* 16 (6) (2015) 947–951.
- [20] AAMC, A.o.A.M.C., Medical education research certificate (MERC), Available from:

- <https://www.aamc.org/members/gea/merc/>.
- [21] H. Tariq, D. Thomson, D. Kahn, 10-year review of Africa's first student surgical society - UCT Surgical Society, *S. Afr. J. Surg.* 55 (2) (2017) 6–7.
- [22] A. Booth, et al., The international association of student surgical societies: a brief history from 2014-2017, *S. Afr. J. Surg.* 55 (2) (2017) 2–5.
- [23] J.H. Matthews, et al., Teaching leadership: the medical student society model, *Clin. Teach.* 15 (2) (2018 Apr) 145–150, <http://dx.doi.org/10.1111/tct.12649> [Epub 2017 May 5].
- [24] P.C. Ferguson, et al., Changing the culture of medical training: an important step toward the implementation of competency-based medical education, *Med. Teach.* 39 (6) (2017) 599–602.
- [25] E. Macdonald, E. Maile, Crossing the divide: hierarchy and teaching, *Clin. Teach.* 11 (7) (2014) 566–567.
- [26] P. Pantelidis, et al., Medical students' satisfaction with the Applied Basic Clinical Seminar with Scenarios for Students, a novel simulation-based learning method in Greece, *J Educ Eval Health Prof* 13 (2016) 13.
- [27] A. Willems, et al., Interprofessional non-technical skills for surgeons in disaster response: a qualitative study of the Australian perspective, *J. Interprof. Care* 27 (2) (2013) 177–183.