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## Medical education in Greece: Necessary reforms need to be re-considered

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### ABSTRACT

For the past years, and even more now with the major challenge of the COVID-19 pandemic, we are faced with the inadequacies that undermine the healthcare system in Greece. As healthcare system performance and medical education are directly and reciprocally linked, a substantial part of healthcare services' dysfunctions could be partially attributed to the training of the young doctors. Thus, in order to improve the performance of the healthcare system in the best interest of patients and communities, the education of healthcare personnel should be a priority. By reviewing the existing literature in combination with our experience we attempt to delineate the weak points of the undergraduate and postgraduate medical education in Greece. Additionally, based on medical curricula from other countries, we suggest reforms in order to achieve a uniform, clinically oriented, emphasis on training in public health issues in undergraduate medical education. Reforms are also suggested for postgraduate training with regard not only to specialization curricula, but also to the accredited institutions which provide specialty training. Finally, the necessity for Continuing Medical Education (CME) is underlined; medical education must have a continuum that begins with undergraduate training but does not end there; it is life-long learning.

### KEYWORDS

Curriculum infrastructure; medical education reforms; Greece; primary health care education; medical specialty training

### Introduction

Health Systems are defined by the World Health Organization (WHO) as *all organizations, people, and actions whose primary interest is to promote, restore or maintain health* (Health systems 20/20 2012). Assessment of the national health system performance is conducted not only to provide statistical data on the status of public health but also to motivate necessary reforms in order to optimize the national health system services. This will enable the measurement of the impacts of health system reforms and will guide decision-making, disseminate knowledge through cross-country comparisons, and will be an academic exercise and educational process for the public (Bennett and Peters 2015). The evaluation of how a health system performs is based not only on the examination of each system block individually but on a holistic view of the entire system and on the judgment of outcomes and comparisons of these achievements with the expected outcome of what a health system should be able to accomplish. According to WHO, health system performance criteria include equity (fairness on the distribution of resources for healthcare services provision), efficiency (obtaining the best possible results according to the provided resources), access (the extent that health services are provided in a population), quality (ability to satisfy the needs of the population) and sustainability (ability to continue its activities in the future) (Health systems 20/20 2012).

Healthcare system performance could not be described out of the frame of medical education. Reforms in the education system and redefining of the goals and priorities will be quickly seen in the healthcare system. Thus, the alignment of education with the healthcare system will achieve

### Practice points

- Uniform curricula followed by all medical schools in Greece will lead to the gaining of the same education in the different medical schools.
- Introduction of national licensing examination would ensure the uniform and qualitative training.
- Periodic evaluation of the educators and institutions providing specialty will ensure high-quality education.
- Emphasis on primary health care education underlines the significance of the prevention of diseases and public health.
- Continuous medical education, provided by a structured framework, will update the knowledge of physicians on a regular basis.

better results for both patients and physicians (O'Brien and Reed 2019).

Greece is a Southeast European country of 11 million citizens. During the last decade a lot of economic and demographic changes have occurred. The deep financial crisis which started in 2009 led to an irrevocable financial burden for Greek citizens, while cuts in public spending have had a devastating impact on the educational and medical systems – with lasting effects on public health. Furthermore, Greece's economic crisis led to a mass exodus of medical doctors and scientists to other countries (Moris et al. 2017). Probably affected by this socio-economic crisis,

a lot of demographic changes have occurred during the last years. The yearly change of total population is negative (−0.48%) and at the same time the fertility rate follows the same trend with only 1.3 live births per woman in 2020, while the same rate in 1970 was 2.6. Additionally, life expectancy has a rising tendency (Worldmeter 2020). As a result elderly people comprise a substantial percentage of the total population (Economou et al. 2017).

## Greek national healthcare system

### Structure

The Greek National Healthcare System (NHS) is based on a mixed model encompassing both the public and private sectors. It serves 11 million citizens, 21.7% of whom are over 65 years old (OECD 2019). The public sector consists of practitioners employed by the government and the Ministry of Health in health centers distributed all around Greece to provide primary care, prefecture, and tertiary care hospitals.

The healthcare system is managed across the country by the Ministry of Health. The Government coverage scheme is administered through the National Organization for the Provision of Health Services (Greek acronym EOPYY) where 75% of services are covered for all diagnostic tests and medication expenses for all citizens. For individuals with chronic serious illnesses, respective medications are fully covered. There is no or very limited coverage for some services such as dental care, home medical care, testing for certain autoantibodies, temporal artery ultrasound, synovial fluid analysis, molecular genetic tests for certain mutations, and polyparametric prostate MRI.

The private sector consists of private practicing, mostly specialized physicians, diagnostic laboratories, and centers as well as privately run hospitals (Economou et al. 2017).

### Human resources and infrastructure

According to the Organization for Economic Co-operation and Development (OECD), the number of licensed physicians in 2017 in Greece was 6.1 per 1000 population, the highest of all the European Union countries. Actually, this number is an overestimate since the number of professionally active physicians is probably lower since the number of unemployed doctors cannot be calculated (OECD 2019). General practitioners (GP) constitute only a minority of the total number of physicians. The majority of physicians in Greece are specialists as indicated by the high ratio of specialists to GPs which is over 10:1. (European Commission 2017). Furthermore, the human resources, and infrastructure of the public and private sectors are gathered in urban areas while health services in rural areas and the majority of the islands are limited. The number of Intensive Care Units (ICU) beds (6 versus 11 ICU beds per 10<sup>5</sup> population) is lower compared to the average beds in European Union Countries (Rhodes et al. 2012; Economou et al. 2017).

## Medical education

### Current medical education in Greece

The undergraduate medical training (a six-year course) is performed in one of the seven public Medical Schools, located in six different cities of the mainland and one on Crete. Undergraduate studies, when successfully completed, lead to the awarding of Doctor of Medicine (M.D.) degree. The number of students entering the Medical Schools, after national examinations is not adjusted according to a plan to meet the nation's needs for physicians and other health manpower. This ultimately leads to a great number of students per Faculty member and significant brain drain after the students acquire the Medical diploma (Avgerinos et al. 2006). The new physicians are required to serve as general practitioners (district physicians) for twelve months in the public health system in a rural area and only male physicians serve for approximately another year in the military service. Subsequently, the remaining young doctors in Greece start medical specialty training (Graduate education). Graduates from all Medical Schools, irrespectively of their Medical diploma grade, may choose the specialty they prefer and the institution where they wish to be specialized by applying to respective specialty/institution 'waiting lists'. This may result in a considerable waiting time, ranging from 1–10 years, in order to commence with the specialty training depending on the specialty and/or institution of choice (Economou et al. 2017; Kostakis and Mantas 2008). The specialty training lasts from 5 to 7 years according to the particular specialty (Economou et al. 2017).

Deficiencies in medical education in Greece were underlined many years ago, even since 1975, at the time when the government was planning to build the third Medical School of the country. Since that time, it was indicated that during medical studies the students' exposure to laboratory and experimental animal experiences was insufficient and that their involvement in primary patient care should be enhanced. The need to strengthen continuous medical education as well as the problem of a small number of classrooms and laboratories in combination with the overcrowded hospitals was pointed out (Harrell 1975). Now, 45 years later, the same deficiencies in medical education in Greece are still present.

### Undergraduate medical studies

Candidates who are interested in studying medicine are admitted to the Medical Schools of Greece after passing the National university entrance exams. The success of candidates and their admission to a higher education department results from the combination of their marks in the examinations and the order or precedence in which they declared preferences. Medical Schools require the highest scores in the National university entrance exams among all other University disciplines (Georgantopoulou 2009).

Medical students in the first three years (pre-clinical) are taught basic subjects (anatomy, physiology, biology, biochemistry, biostatistics, microbiology, pathology, pharmacology, public health, epidemiology, and pathophysiology) primarily through lectures given by faculty members, while laboratory exposure is limited to few practical sessions. The

student's exposure, during these years to clinical practice, is minimal or non-existing. Thus, the knowledge of pre-clinical years is disconnected from that of clinical medicine (Makris et al. 2015). Being confronted with the enormous data of the current biomedical knowledge, students' efforts are centered to acquire the necessary knowledge in order to enable them to pass the examinations of a given subject. By the time students are entering the clinical years they have forgotten most of the knowledge gained during pre-clinical training and are unable to apply it to the needs of clinical medicine (Schei et al. 2018). It would be ideal if the Faculties of the Medical Schools nationwide will change their curricula and expose the medical students, from the first years of their studies to patient care, to learn how to communicate with patients by acquiring a detailed medical history and to be exposed to the beauties of the medical art, by learning how to perform a complete physical patient examination and by caring for sick people (Junger et al. 2005; Deveugele et al. 2005; Street et al. 2007; Schei et al. 2018). If this approach of education would be provided, it could lead to the development of better trained physicians.

During the next three years (clinical) of medical studies, in the majority of Medical Schools the clinical training is mostly theoretical. Clinical practice takes place in accredited departments or hospitals (Georgantopoulou 2009). However, very limited 'hands-on' patient training is enforced and/or performed. This results in having young doctors with plenty of theoretical knowledge but a limited clinical experience. According to Hellenic Quality Assurance and Accreditation Agency, the medical curriculum in the Medical School of the University of Athens, the older Medical School in Greece, still gives emphasis to theoretical knowledge, without substantial emphasis on practical skills and hands-on training (Kontos et al. 2015). This has to change! The proposed changes in the medical curricula are evaluated by independent committees every four years (Government Newspaper of the Hellenic Republic 2005). However, during the last years the educational curriculum has not substantially changed (Kontos et al. 2015). The last year of medical studies, the 6th, is purely clinical. However, the acquired clinical skills are not optimal due to the fact that very limited responsibility is given to the students for patient care. Some years ago, in the Medical School of the University of Thessaloniki, a pilot program was introduced. It included students' training in patient-clinician communication, clinical, and research skills development. Medical students, were required, among others, to act as nurse-assistants in a tertiary city hospital (Panagopoulou et al. 2006). Taking into account that the living, accommodation and studying expenses of most Greek students are covered by their parents (Koussidis et al. 2002), the introduction of this pilot program will not only promote their patient care education but could also be a source of an income for students.

During the six years of medical studies, the students are examined only by committees comprised of faculty members for their acquired knowledge. Examinations are either written or oral and are performed at the end of each semester. There are no central, national, objective accreditation exams, after the completion of studies, which will provide the opportunity to compare and reveal the level of

offered educational programs in the seven Medical Schools. Changes in the medical training programs as well as the introduction of national accreditation examinations have been raised by a large proportion of students (Georgantopoulou 2009; Makris et al. 2015). The results of these national examinations would help faculty members of each Medical School to improve deficiencies in their training, which would be pointed out from the performance of their students.

Furthermore, unification of the Medical Schools' curricula is needed, which will lead to the acquisition of similar knowledge and clinical skills of all graduates from the different Medical Schools. Contemporary Medical School curricula are characterized by 360 mandatory European credit units, 78% covering standard educational objectives and content for all students, and 22% corresponding to elective courses. Curricula of other countries include all the elective disciplines into a transition period before specialty training starts according to individual preferences. During this period, future doctors can undertake responsibilities to improve their diagnostic and therapeutic skills (ten Cate et al. 2018) and grow their critical thinking (Schei et al. 2018). In this way the young physicians will be prepared to serve adequately as physicians, the obligatory year of public health, and/or military service.

Despite the above-described deficiencies in the training of medical students, individuals with passion, devotion and desire to acquire contemporary knowledge and practical skills, participate actively in patient care during the clinical rotations, in their free time voluntarily work in emergency rooms, attend and help senior physicians in their practice, or get involved in research projects. These well-trained young doctors usually find their way to continue their education in well-organized hospitals in other European countries or overseas. Most of them, however, remain permanently abroad, leading to serious brain-drain in our country.

### ***Obligatory service in a rural area (district doctor)***

Studies conducted in other countries have revealed that the majority of newly graduated physicians, appointed to provide medical service in rural areas, due to lack of clinical experience, are not self-confident to provide appropriate medical care to patients (Goldacre et al. 2003; Karakus and Şenyer 2014; Gazibara et al. 2015; Bugaj et al. 2018; van der Voort et al. 2019). This is particularly true for the Greek young physicians. It would be ideal if the practitioners of the local public health centers will have the desire and the knowledge to supervise and support the medical actions of their young colleagues. In this way young physicians will be exposed to general medical practice and primary patient care, which is missing from their undergraduate studies (Mariolis et al. 2007; Economou et al. 2017).

### ***Specialty training***

Specialties in different disciplines of medicine are provided by University hospitals and by certain departments of NHS hospitals. As mentioned earlier entry exams to start a specialty do not exist (Economou et al. 2017) which causes a significant delay in the commencement of specialty training. A substantial proportion of undergraduate students

supports the implementation of examinations before acceptance for specialty training. However, vigorous reactions of student syndicates have repeatedly obstructed this necessary evaluation, despite that it has been proposed by the Ministry of Health and Medical Associations. Thus, regardless of Medical school performance, straight-A, very well, mediocre, and tolerably trained doctors wait for years in order to start specialization. In this wasted time for education, the young doctors develop family responsibilities, and their desire for education declines (Moutsopoulos 2017). However, excellently trained, ambitious, with passion to acquire knowledge young doctors either spend this time in research to acquire their thesis or find their way for training in hospitals of Europe or the USA, adding-up to our country's 'brain drain' (Makris et al. 2015; Kostakis and Mantas 2008; Avgerinos et al. 2006).

Additional hindrances interfere with the optimum specialty training in our country. Careful selection of departments that will provide specialty, on the basis of human resources and available facilities (Barajaz and Turner 2016), is not performed (Moutsopoulos et al. 2017). Periodic evaluation and accreditation of the hospitals providing specialty do not exist either. Unified national curricula for specialization per specialty have not been developed by professional specialty organizations in collaboration with the Medical Schools and the Ministry of Health (Makris et al. 2015; Kostakis and Mantas 2008; Moutsopoulos et al. 2017). Furthermore, the specialization of a trainee is sometimes possible to be completed in the same department where she/he was initially placed, despite the fact that in the particular hospital two or even more departments of the same specialty may operate (Government Newspaper of The Hellenic Republic 2016). This depletes the opportunity from the trainees to be exposed to many more faculty members with different interests in education, level of knowledge, empathetic approach to patients, and morality. Additionally, training links between different specialties, within the specialization curriculum, do not exist and should be developed since cooperation and learning between different specialties will make trainees realize that the practice of medicine has common principles despite the different disciplines and specializations (Moutsopoulos 2017; Arulanandam and Macpherson 2015). Moreover, periodic trainee evaluation for the acquired clinical skills, knowledge, in-depth interpretation of laboratory and imaging tests, ability to communicate with patients, interact with colleagues, superiors, nurses, and paramedical personnel is not performed (Kostakis and Mantas 2008). Neither is the performance of the educators systematically evaluated by the trainees (Moutsopoulos et al. 2017), although a big proportion of medical students and doctors in training are not satisfied by the support from their tutors (Makris et al. 2015). The evaluation of educators by the trainees will motivate the improvement of their teaching skills. Achieving an effective mentoring process in medical education is cardinal. Mentoring is not only confined to transmitting knowledge, but it is also a way of conveying moral values and shaping the character and personality of trainees (Moutsopoulos 2019).

Training for specialization in Greece could change and improve radically if after careful evaluation, Academic Educational Units will be formed, which for each specialty

will include a University clinical department, a department of an NHS hospital, a department of a private hospital, in the cities where such hospitals function and a primary care unit. All departments of the Academic Unit will follow the same educational program and complement each other. The trainees will have a carefully planned rotating educational program through all departments of the Academic Unit, during their training years and thus will have the opportunity to be exposed and learn from different educators, different populations of patients, and different approaches to medical care (Moutsopoulos et al. 2017).

With the high percentage of doctors being specialized in our country, primary care has been neglected. Young doctors, even during their undergraduate studies, do not get exposed to enticing training programs of general/family medicine through which it will be emphasized that a patient-centered approach is mandatory for the management of multiple morbidities and that preventing diseases is more important than treating them. Therefore, the majority of them do not make a career choice to serve the medical discipline of general/family medicine. Nonetheless, training general practitioners who provide patient-centered medical services instead of so many specialists seems to be a reasonable approach these days (Mariolis et al. 2007; Nair and Fellmeth 2018). Pilot programs introducing community-oriented medical education activities were implemented at the University of Thessaloniki, Greece. The benefits, as well as the difficulties of such programs, were underlined (Panagopoulou et al. 2006; Smyrnakis et al. 2013).

### ***Continuing medical education (CME)***

Lifelong education is obligatory only under the code of medical ethics. Continuing professional development, linked with CME, is a process of systematic learning that enables physicians to be constantly brought up to date on developments in their field and thus ensure their competence to practice throughout their entire career. Actively pursuing this quality lies at the discretion of each individual physician.

CME in Greece is provided through seminars, symposia, and scientific meetings. The participation of physicians is voluntary (Economou et al. 2017), since there is no official and structured framework organizing and evaluating CME.

In other countries, CME programs overseen by an accreditation council for CME have been established and, in some, participation is required by state medical licensing boards and hospital credentialing committees in order to maintain the right to practice.

Specialty certification for life is questioned since not only in the course of time do the physician's clinical skills fade (Choudhry et al. 2005), but also the rate of knowledge produced over the years is augmented. The doubling time of medical knowledge is constantly shrinking (Densen 2011). As such, the American Board of Medical Specialties has established another process for CME in the form of maintenance of certification (MOC) (Cook et al. 2015). Until recently, once a physician achieved board certification in his specialty that certification was valid for life. Since institution of MOC, however, specialty certifications are

time-limited, requiring participation in MOC to renew certification every 10 years (Colenda et al. 2019).

Such uniform obligatory CME programs should also be instituted in Greece. Through these training programs, at regular intervals, physicians will need to prove advancement in their knowledge and update with new trends or developments in the fast-growing field of medicine in order to provide contemporary medical services to their patients. So far, however, this is not yet demanded by the Hellenic medical associations (Moutsopoulos et al. 2017).

Besides updating the knowledge of physicians and improving the medical services provided, CME should also educate doctors on how to orthologically use new healthcare technologies invading everyday clinical practice, in a time when economic resources remain unchanged. Doctors of the 21<sup>st</sup> century should be educated to encompass technological innovations in everyday clinical practice, avoiding at the same time the inappropriate use of diagnostic tests and improper therapeutic interventions that threaten patients' health and the well-being of the healthcare system (Nair and Fellmeth 2018; Goodman 2010).

## Concluding remarks

In a continually changing landscape of medicine with advancements in technology and the increasing emphasis on patient-centered care, now more than ever it is time to implement all education reforms. In order to so, in Greece, another critical impediment to these changes should be overcome; the reaction of the student's syndicates. Despite the fact that they represent only a small fraction of the students, they squat in the Medical School laboratories every time the government attempts to pass any reform. Since they have high political power a lot of times the government defers to their reactions. This results not only in the loss of educational hours but also suspends every attempt for reform (Moutsopoulos and Roussos 2017; Makris et al. 2015; Harrell 1975). Universities should not be associated with political parties but should function as independent units that serve only the acquisition and dissemination of knowledge. Medical educators, medical students, physicians and the state should realize that although the challenges for the education of the best possible physicians are great, the benefits to medicine and society are enormous.

Although throughout this viewpoint manuscript we have presented the dysfunctions of the medical education and the healthcare system in Greece, we would like to point out that despite the small population of Greece, 3% of the world's most highly cited scientists are Greeks (Ioannidis 2017). Most of these scientists completed their education in Greece and left their country in order to seek higher standard specialization and working opportunities in other countries. Many of them were absorbed by the national healthcare systems of the countries where they migrated, were competitive, and distinguished.

## Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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