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GENERAL INFORMATION

The importance of master's degree and doctorate degree in general surgery[☆]



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KEYWORDS

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Postgraduate studies;
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Leadership

Abstract

Background: The Doctor of Philosophy is the highest academic degree that can be obtained in universities. Graduate Education Programme in Medicine in Mexico is divided into 2 major categories: Medical Specialty and Master studies/Doctor of Philosophy.

The objective of this study was to demonstrate the importance of master's degrees and Doctor of Philosophy in general surgery.

Material and methods: A literature search in PubMed and Medline among others, from 1970 to 2015 with subsequent analysis of the literature reviews found.

Discussion: The physicians who conducted doctoral studies stand out as leaders in research, teaching and academic activities. Dual training with a doctorate medical specialty is a significant predictor for active participation in research projects within the best educational institutions.

Results: It is important to study a PhD in the education of doctors specialising in surgery, who show more training in teaching, research and development of academic activities. Currently, although there is a little proportion of students who do not finish the doctoral programme, the ones who do are expected to play an important role in the future of medical scientific staff. It has been shown that most doctors with Doctor of Philosophy have wide range of career options.

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PALABRAS CLAVE

Maestría;
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 Grados académicos;
 Liderazgo

Conclusion: The importance of doctoral studies in the formation of general surgery is due to various reasons; the main one being comprehensively training physician scientists who can develop in clinical, teaching and research.

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Importancia de la maestría y el doctorado en cirugía general**Resumen**

Antecedentes: El doctorado es el mayor grado académico que se puede conseguir en las universidades. El programa educativo de posgrado de medicina en México se divide en 2 grandes rubros: la especialidad médica y los estudios de maestría/doctorado.

El objetivo de este estudio fue demostrar la importancia de la maestría o doctorado en la especialidad de cirugía general.

Material y métodos: Búsqueda bibliográfica en la base de datos PubMed, Medline, entre otros, entre los años 1970 y 2015, con posterior análisis de las revisiones bibliográficas encontradas.

Discusión: Los médicos que realizaron estudios de doctorado se destacan por ser líderes en investigación, docencia y actividades académicas. El entrenamiento dual de la especialidad médica con doctorado es un factor significativo que predice una participación activa en proyectos de investigación en las mejores instituciones educativas.

Resultados: De suma importancia es el estudio de un doctorado en la formación integral de médicos especialistas en cirugía, los cuales demuestran mayor capacitación en docencia, investigación y desarrollo de actividades académicas. Actualmente, aunque es poca la proporción de alumnos que concluyen el programa de doctorado, se espera que desempeñen un papel importante en el futuro del personal médico-científico. Se ha demostrado que la mayoría de los médicos con doctorado tienen amplia variedad de opciones profesionales.

Conclusión: La importancia de los estudios de doctorado en la formación de cirugía general estriba en diversas razones, entre las cuales la principal es formar de manera integral a médicos científicos que puedan desarrollarse en clínica, docencia e investigación.

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Background

A doctorate degree is the highest academic achievement possible at University and may be interpreted as a full and complete knowledge of a particular subject. It originates from the University of Bologna in the 18th century, when it was decided that there was a need to choose the most skilled people to teach the classes. From that moment, the concept of a doctorate has developed over time, adopting different meanings depending on the university concerned, the educational system and the country in question.¹

During the last 4 decades in Mexico, as throughout the world, there has been an increase in the financing and support of postgraduate programmes in both state and private institutions, aimed at improving, promoting and advancing in scientific research development.¹⁻³

This trend has been appreciated in the different educational programmes in United States and Europe since the 60s, where post graduate level education leads on to a master's degree and doctorate in medical specialty. These programmes are outstanding for training young doctors to

become leaders in the field of research and medical training, whilst simultaneously gaining a complete command of basic sciences and clinical subjects.⁴ The leading universities in this regard are, among others, Harvard, Johns Hopkins, Yale, the Baylor Medical School, Texas and the State University of Ohio.⁵

In 1959, Johns Hopkins University was the first institution to develop a master's and doctorate programme. During the 1980–2005 period, 289 medical students received this degree and academic standard, 86% of these graduates are involved in the academic area of medicine, 10% work in the private and public fields in health care and 4% are employed in the pharmaceutical or biotechnological sector.⁵

The Mayo Foundation for Medical Education and Research, affiliated with the University of Minnesota, aims at establishing a higher level for training of specialist doctors, enabling resident doctors to obtain masters degrees and doctorates.⁶

The educational post graduate medical programme in Mexico is divided into 2 major sections: medical specialty and masters/doctorate studies. This division impedes

educational training in research and teaching simultaneously with the medical specialisation courses, which forces the graduate of a surgical medical career to opt between one of these 2 alternatives, without the opportunity to study both. At present, there is already an undergraduate programme in the country which may lead to a degree and a master's and doctorate. These may be gained after spending a longer period of time studying than is the norm for a degree in medicine, with the possibility of aspiring to a post doctorate in internationally renowned institutions. In the Universidad Nacional Autónoma de México, in the Faculty of Medicine, the Programa de Estudios Combinados en Medicina (PECEM) is taken by students who wish to have a surgical medical degree but have a vocation for basic and clinical research. Its aim is to impart basic research to clinical practice in the shortest possible time, thus acting as a basis for translational medicine.

The aim of a programme which combines an undergraduate and postgraduate scheme is to ensure that students acquire knowledge, skills, clinical and research experience for exercising a medical profession in a context characterised by the complexity of the current health demands of the population. They need to develop capacities and skills to carry out research activities in different biomedical fields, to acquire the necessary values and attitudes to analyse and provide a solution to health problems. This in turn may lead to the student questioning and generating knowledge, contributing to scientific production in the medical speciality in which they have trained and in their area of interest. They may thus participate in the integration of multidisciplinary groups which match scientific research to national needs and priorities in health matters, reflecting mastery of theoretical knowledge, and the practical skills acquired for practising as a doctor and researcher or for continuing with a medical specialisation.⁵ It is important to mention that this programme was implemented from year 2010, and the results of the first generation of graduates are therefore expected in 2018.

One recent report from the American College of Surgery reiterated that the essential role surgeons play in advancing science and highlighted the need for clinicians and surgeons to be skilled.⁷ In a study conducted with 939 graduates who had studied for a doctorate, it was shown that only 107 (11.4%) were exercising a surgical specialty, compared with the doctors subscribed to the specialisation programme in internal medicine, who were offered first places (28.8%).⁸

The aim of this study was to analyse the importance of simultaneous master's and doctorate programmes with general surgery as the specialty subject.

Material and methods

A reference search was made in PubMed, Medline, the data base on Latin American Literature in Health Sciences (LILACS), International Serial Data System, Periódica-Índice de Revistas Latinoamericanas in Ciencias-CICH-UNAM; Bibliomex Salud and Ulrich's International Directory. From 1970 to 2015, based on key words in Spanish or English: masters, doctorate, medical speciality, surgeon, surgery, postgraduate studies, academic levels. Those articles without a specific description on the study design and its outcome in

the target population were excluded. From the article or combination of articles which described the association of master's and doctorate programmes, with a medical speciality, an initial phase in the country and language was identified in those where the study was to be carried out, the type of academic programmes, the age groups, gender, time of duration of each post graduate programme, the entry requirements and the successful matriculation in the programme.

Discussion

In one study conducted by Brass et al., in the National Institute of Health in 2007 and at the beginning of 2008,⁹ a large percentage of doctors who graduated went into residency and the majority were employed in the academic field, research institutes or the industrial sector. A lower percentage was employed in private clinical practise. Of the doctors who were engaged in the academic area, most were employed in research, and a little over 50% of them had some type of financing. Many people with doctorates carried out in a research laboratory reported conducting basic research, and translational research too.

Students taking a doctorate programme represent only a small proportion of all medical students in United States. However, they are expected to fulfil a major role in the future of the medical and scientific staff, as was the case of Barry Blumberg (Nobel Prize winner, 1976),¹⁰ Francis Collins (Director of the National Institutes of Health and co-founder of the Human Genome project¹¹ and Alfred G. Gilman (Nobel prize winner, 1994).¹²

Leadership is one of the skills which the masters/doctorate programme develops. This has been defined as a key skill for the functioning of research teams and one of the main reasons for the success or failure of health systems.¹³ Constant fostering of this aptitude is important in translational medicine, as interaction between team members is to be encouraged. This is fundamental to the quality and safety of the patient and also the establishment of a shared mental model and efficient communication between work team members.¹⁴ The team which interacts with an effective leader adheres more strictly to established protocols, maintains a lower number of medical errors and consequently obtains more favourable results for its patients. This acts as a base in the event of new protocols originating from the previous outcome.¹⁵ Health professions who receive this type of programme from the initial stages of their degree enjoy exponential learning during their training as doctors, since they acquire the necessary skills to establish themselves as the leader of a multidisciplinary team, where group output may be optimised, with the person who collaborates in their professional practise, both in the clinic and in research.^{16,17}

The medical educational environment which offers master's and doctorate programmes has changed notably in the last 15 years. The demographic characteristics of medical school graduates have also changed and particularly regarding the proportion of women among the medical student population which has constantly increased and is now close to 50%.¹⁸ There has been an increase in preferences for choosing a masters or doctorate in medicine for recent graduates in the United States, and the number of those

choosing a speciality such as surgery, internal medicine and paediatrics has subsequently decreased. In contrast, a higher proportion of undergraduates have decided to follow a course related to preventative medicine.^{19,20} Furthermore, the options for professional adjustment for doctors has increased a great deal beyond academic medicine or private clinics and now includes full-time clinical science researchers in the professional field.²¹

The variables associated with greater probability of graduating from a doctorate programme include planning a career in research (OR [Odds Ratio]: 10.30, confidence interval [CI] 95%: 8.89–11.93); the cost of education (debts of $\geq$ \$150,000: \$100,000; \$149,999; OR: 1.85; CI 95%: no educational debt OR: 17.41; CI 95%: 13.22–22.92) and reception of medical school grants or subsidies (OR: 3.22; CI 95%: 2.82–3.69).²²

The variables associated with a lower probability of graduating with a doctorate include: being a female (OR: 0.68; CI 95%: 0.60–0.77); race/ethnic origin (OR: 0.64; CI 95%: 0.52–0.80) and in comparison with internal medicine, foreseeable training in emergency medicine (OR: 0.58; CI 95%: 0.40–0.84) or surgery (OR: 0.70; CI 95%: 0.57–0.85).²²

There are very few aspirants to the masters/doctorate programme because there is a need for an entry profile and certain requisites such as outstanding academic qualifications and not all aspirants are successful. In 2007, over a third of the masters/doctorate programme aspirants who were invited to interviews were not accepted on the programme. Despite the selection process for the programme, approximately 1 out of every 4 students who matriculate in the masters/doctorate programmes at the same time in medicine do not manage to complete the programme.²²

The surgeons who participate simultaneously in master's programmes and doctorates acquire certain advantages, such as becoming trained up in research and impacting educational institutions. There is a prevalence of physicians and surgeons with doctorates within the best educational institutions in the United States, who are more profoundly involved in teaching and research in national health institutions, compared to physicians who do not have a doctorate.²²

Although surgery is the specialty chosen by one in every 8 (12.1%) students at the start of the masters/doctorate programme, it is the second specialty with the greatest demand only after internal medicine (20.9%) and is equally associated with a lower percentage of participants who conclude it.

Historically, graduates from the masters/doctorate programme are more likely to choose specialties such as internal medicine, neurology, pathology or paediatrics. However, students currently taking the programme show greater interest in a broader spectrum of specialties, among which are surgery, ophthalmology, pathology and family medicine.²²

In the last 2 decades, the number of graduates in neurosurgery with doctorates has increased from 10.2% to 25.7%. The study concludes that the dual training of the specialty with a doctorate is a significant factor leading to active participation in research projects in the best educational institutions in United States. A study was also conducted to determine the curricular outcomes of doctors in a simultaneous doctorate programme compared with those who

did not participate in one, and it was discovered that a larger percentage of doctors taking both courses were able to complete them.²³ The surgeons who had a doctorate were able to provide essential technical knowledge to a dynamic surgical department, with contemporary educational programmes and collaborating with the curricular programme and the assessment of overall performance.^{9,24} Moreover, they were capable of introducing new basic-clinical research programmes with significant results.

In 2006 the National Resident Matching Programme reported that the groups of specialties where there were a higher proportion of graduates from the masters/doctorate programme, were 3 times more likely to be accepted to the specialty they aspired to, regardless of finding themselves among the specialties which were in greater demand, compared with those who graduated without one.²²

The training of doctors for research who are also competent in medical practice continues to be a challenge. Factors such as little available time, the high costs involved in a medical degree, and lack of support from educational institutions are the major obstacles preventing doctors from continuing to train as basic-clinical researchers.²⁵ A short, medium and long-term scientific surgeon project could be put into place with an eye to the future, through publications, presentations at congresses, clinical or basic project proposals, and personal investment in continuous medical training.^{26,27}

The modern era of basic medical sciences has produced a large quantity of knowledge, proof of which is the molecular biology, immunology, genomics and proteomics. These new areas of knowledge may be applied to new diagnostic, prognostic and therapeutic testing, which would be another advantage for those developing basic scientific research projects;²⁸ A doctor with a doctorate is therefore better prepared to create the link between research in clinical medicine and basic sciences.^{29,30}

Postgraduate masters or doctorate studies, and obtaining the level of medical speciality, are complementary to a doctor's professional career: these bases have been reviewed and put forward as viable and highly recommendable.^{31,32}

The options of these complementary studies may cover medical science areas, mainly focused on clinical trials. Biomedical and sociomedical sciences, together with projects relating to the basic area, and other equally important and appealing areas in tune with profile and personal interests including health centre administration, marketing, public health, business and accounts, biostatistics, bioethics, and human resources.^{33–36}

In September 2010, the Consejo Nacional de Investigación published a database analysis about doctorate and research programmes in United States. The report describes the classification of over 5000 doctorate programmes, of which 982 belong to biomedical sciences.³⁶

Rosenberg analysed the data which the Medical Scientist Training Programme provided from 1970 to 1990, in which the graduate researchers of the programme had a greater probability of continuing with their post-doctorate studies, receiving external funds for research and exponentially increasing their number of publications.³⁷

Doctorate studies are highly relevant as a complementary part of a physician-surgeon's training, for developing

skilled individuals who will rise to the challenge and accept their role as leaders with the current goals of sickness-health affecting the world population, which requires professionals who are fully prepared both in academic research and activities that allow for follow-up and improvement of this type of programme.

Although the proportion of students who graduate from the doctorate programme is slight for various reasons it is expected that they will become medical and scientific personnel leaders. It has also been demonstrated that the majority of doctors with doctorates continue their professional training which is compatible with their medical and scientific training and the variety of their possible professional options increases. They should also consider the possibilities of designing their training to anticipate their career options and maximise their possibilities of success as researchers.

In addition, they acquire advantages such as the ability to introduce new impacting basic-clinical research projects in educational centres, with heavy involvement from the teaching staff and research in different national health institutions.

Conclusions

One of the greatest challenges in the academic sphere is to produce doctors driven by research who are also competent in clinical practice. The reasons why it poses such a challenge are the fact that doctors have little available time, costs for doctorate programmes are high and there is a lack of support from educational centres.

Mexico needs the promotion of an initiative that would allow medical specialisation studies and doctorates to be taken simultaneously in order to train leaders in research, teaching, basic sciences who may also continue to develop in their medical practice. Particular emphasis needs to be placed on the surgical area, where there is a lower relationship between the specialist and the academic level compared with other medical specialties such as internal medicine.

Given that the modern era of basic medical sciences has produced a large volume of knowledge, we consider training to be essential, together with the creation of academic programmes to strengthen academic training. When coupled with scientific research, this would promote the development of diagnostic, prognostic and therapeutic testing, which is the other advantage for individuals who are developing research projects in basic sciences. This reinforces the fact that a doctor with a doctorate is better prepared to provide connections in research between clinical medicine and basic sciences.

Inter-institutional agreements between academic seats, such as universities, associations, societies or medical academics involved should play an indisputable role in the training of human resources.

Conflict of interests

The authors have no conflict of interests to declare.

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