

Development of the Research Competency in the Curriculum of a Mexican Medical School

Gregorio T. Obrador^{1,2}

¹ Universidad Panamericana School of Medicine, Mexico City, Mexico

² Tufts University School of Medicine, Boston, MA, USA

Introduction

In Mexico, students start medical school after completion of senior high school and typically are 18 years of age. At the Universidad Panamericana School of Medicine, medical studies include three semesters of basic sciences and five semesters of clinical sciences, followed by a year of acting internship, and a final year of social service assignment. Although most students do the latter in underserved rural or urban clinics, up to 5% of the graduating class can apply for a research position. The Secretariat of Health is responsible for selecting candidates for the approximately 80 social service assignment research positions available nationwide based on the students' previous academic and research performance.

Universidad Panamericana School of Medicine is a private, not-for-profit, medical school located in Mexico City. Founded in 1996, it currently has a total of 230 students, with an entering class size of 58 highly selected students. The school's mission is to educate physicians who distinguish themselves not only for their competencies directed to further specialty training and research, but also for their humane attitude, strong ethics, and social responsibility. The Universidad Panamericana School of Medicine's curriculum was thoroughly revised in 2003. The reasons to include research in the mission and the curriculum were to develop in the students more critical thinking, to provide them with essential tools to perform research, and formation of future researchers.¹⁻⁵ In this paper, we describe the challenges, possible solutions, operational aspects, and preliminary results of our

experience with the changes made to the medical school's curriculum regarding research.

Challenges to develop the research competency in the medical school curriculum

Development of research competency in the medical school curriculum faces multiple challenges. First, students are rather young (see above). Second, most high school students have none or only minimal research experience and often lack interest in it. Third, there are significant time constraints due to the short duration of medical school, the increasing body of knowledge and skills that are to be acquired, the short summer vacation time (limited to one month, or less since the end of the fourth year), and the competition for research time by "more appealing clinical courses." Fourth, a need for some basic knowledge and skills before students are capable of doing research. Lastly, a significant commitment of human and financial resources to provide a meaningful research experience to the students.

Possible solutions to develop the research competency in the medical school curriculum

Given the multiple challenges involved with development of the research competency in the medical school's curriculum, we sought and analyzed possible solutions. Regarding the students' young age, we could require them to take a 1-2 year premedical course before entering medical school. However, this requirement could prevent many candidates from applying to our medical school. The lack of research experience and/or interest could be mitigated by a careful selection of entering students, which would be possible due to the large number and the high quality of applications we receive each year. The admissions' profile could be changed so

Corresponding author: Gregorio T. Obrador, MD, MPH
Universidad Panamericana School of Medicine, Donatello 59;
Col. Insurgentes Mixcoac, Mexico, DF 03920; Tel: 52+ (55)
1251-6856; Fax: 52+ (55) 5482-1720; Email:
gobrador@up.edu.mx

that students with previous experience and/or interest in research could be given additional points. Instructional modules on the basic research concepts and opportunities to join a research team in action could be offered before high-school students enter medical school.⁶ Research interest could be built or enhanced by highlighting research aspects on the topics presented in regular medical school courses by professors who, in addition to being teachers, are active researchers; moreover, teaching laboratories could be redesigned so that students become familiar with most of the current basic research techniques.

Regarding time constraints related to the short duration of medical school and the increasing body of knowledge and skills to be acquired, lengthening the duration of medical studies would be an option; however, this solution would be unpopular among students. Offering summer research programs would also be a possibility, but restricted to those who wished to take them on an elective basis. Competition for research time from “more appealing clinical courses” could be reduced by considering the research experience as a subject, and by giving the same weight to the grade obtained as that of any other subject. Additionally, students could work in teams, particularly for projects that are more time consuming, and have one-to-one tutoring as well as a time line for successful completion of their projects.

With regard to the need for basic knowledge and skills before being capable of doing research, the curriculum required revision regarding the sequence and content of subjects to see if they would provide the necessary knowledge and basic research tools, before embarking in a project. Based on the premise that, for learning how to do research it is necessary to do research, development of hands-on-experience by participating in a research project was an essential component for the research competency to be acquired. Lastly, the project required careful consideration and planning of the human and financial resources needed for the school to provide a meaningful research experience.

Operational aspects

Starting in 2003, changes in the medical school’s curriculum regarding the research competency were operationalized and implemented as follows:

- Admissions requirement
 - Besides brightness and motivation, among other factors, admission evaluation included prior research experience and/or demonstrated interest in research
- Sequence of subjects and teaching methods
 - Basic sciences were taught in the first three semesters and clinical sciences in semesters four to eight
 - Teaching labs provided students with hands-on-experience on the most commonly used basic science research techniques
 - Professors were selected based on their teaching and research ability, and were asked to emphasize research aspects on the topics covered in regular courses
 - The following courses were redesigned and sequenced to provide basic knowledge and skills for doing clinical and epidemiological research:
 - Medical informatics and literature searches (1st semester)
 - Public health (2nd semester)
 - Biostatistics (3rd semester)
 - Clinical epidemiology (5th semester)
 - Social and preventive medicine (7th semester)
- Research project subject
 - 5th semester:
 - Students are asked to attend a brief research conference series on research methodology, statistical methods, protocol components, and ethics committees
 - Students are asked to choose their research project from either a brief catalogue prepared by the school’s research projects committee or their own interest. In the latter case, projects should be approved by the school’s research projects committee. Projects can be done at the medical school or any of the affiliated hospitals, particularly the National Institutes of Health. For some projects, teams of two to four students are acceptable. Each

student/team is assigned a primary tutor at the research site and a secondary tutor at the medical school. Additionally, students can request assistance on research methods from professors of the Department of Epidemiology, Statistics, and Public Health. A time-table is provided for the students, which typically includes three meetings and several reports during the course of the semester. Students are expected to dedicate a minimum of four hours per week to their research project.

○ 6th semester:

- After their research projects are approved by the school's research projects committee, all students are required to take the Research Project I subject. The goal is to write the full protocol of the research project they selected. If required, students are responsible for getting approval by the Institutional Review Board (IRB). Grading of the subject is based on review of the written and oral presentation of their protocol, standardized evaluations by their two mentors, review of the ongoing reports and participation in scheduled meetings.

○ 7th semester:

- All students are required to take the Research Project II subject. The goal is to conduct the research project. If students were able to complete their written protocol earlier, they can start conducting it in the previous semester. Grading of the subject is based on the written and oral presentation of their preliminary results, standardized evaluations by their two mentors, review of the ongoing reports and participation in scheduled meetings.

○ 8th semester:

- All students are required to take the Research Project III subject. The goal is to finish the project, analyze the results, write the final report and prepare a presentation for Research Day (Figure 1), which is held in late April each year. Depending on quality, projects are

selected for oral or poster presentation. Students are trained on how to make slides or posters and rehearse before presenting in Research Day. Grading of the subject is based on the written and oral/poster presentation of their final results, standardized evaluations by their two mentors, review of the ongoing reports and participation in scheduled meetings.

- Research Day is attended by all medical students and consists of a conference by an outstanding researcher, either from Mexico or from abroad, followed by 4-5 oral presentations, poster presentations, and oral presentations by the 2-3 students who are doing their social service assignment year in research. It ends with an award ceremony of the best projects. Selection of the latter is made by a committee formed by intramural and extramural researchers.

- Research electives

- Students are allowed to take research electives since the first year of medical school. They must be approved by the school's research projects committee. Some students also do summer research electives in Mexico or abroad.

- Research award

- During each year's graduation ceremony, an award is given to the student who had more high-quality research accomplishments of his entire class as evaluated by the school's research projects committee.

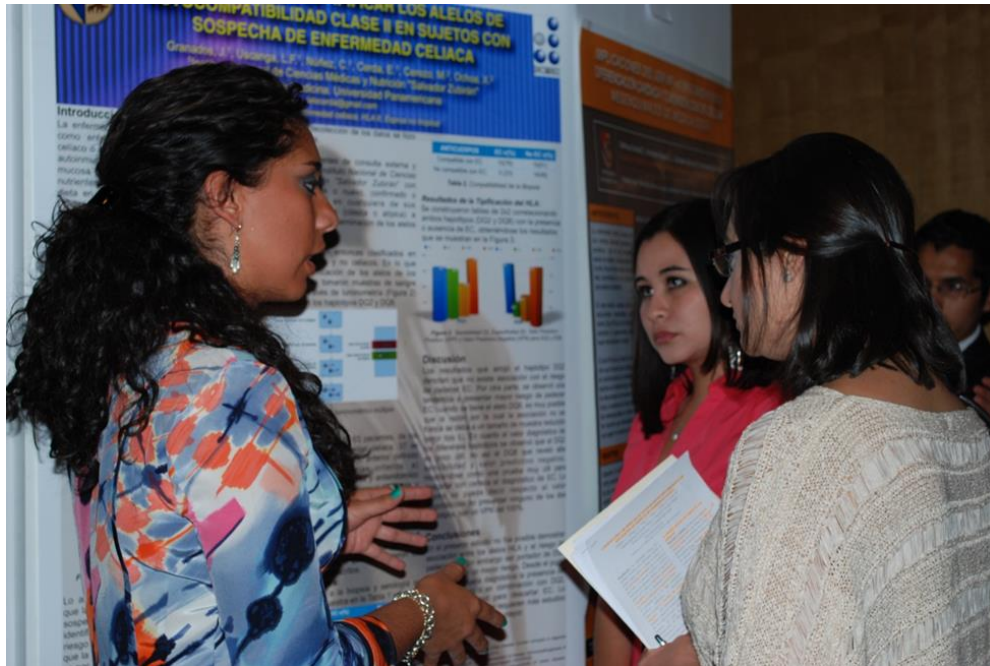


Figure 1: Medical students during Research Day

Results of the changes in the medical school curriculum

Changes in the medical school curriculum went into effect in 2003; thus, six cohorts of students have gone through the revised research curriculum between 2007 and 2012. Although it is relatively early to judge, we have noticed a number of positive preliminary results. First, 75% of medical students view the research component of the curriculum as a competitive advantage for them. Second, 70-75% of medical students indicated that the subject Research Projects helped them to develop the following skills: literature search, critical review of the literature, protocol design, quantitative analysis, critical thinking, team work, and scientific writing. Third, most students become truly interested in research as documented by the following: a) at least one third have a good number of publications and presentations at national and international scientific meetings; b) launching in 2012 of a students' research journal titled UPdate Journal of Medicine; to date, 21 articles have been published, 7 of which are original and 8 review articles; c) passing of research projects done by more advanced students to younger students; d) development of a "culture" of doing research among the students; e) 60% of medical students indicated that they were interested in doing research in the future and an increasing number of alumni are pursuing postgraduate research training. Fourth, Research Day has become one of the most notable events of

the school; invited speakers and external research evaluators often indicate that the level of the presentations is far superior to that expected from a fourth-year medical student. Lastly, it is possible to underscore the research competency in the medical school curriculum without risking students' academic performance and achievement of other competencies.

Since there will be seven cohorts of students that have gone through the revised research curriculum in 2013, we are in the planning stages of a standardized and more objective evaluation of the results of the research competency among the students. We are also planning to compare our results with those published in the literature.⁷⁻¹⁰

Conclusions

The research competency is a fundamental aspect of the medical school's mission. Inclusion of this competency in the medical school curriculum is faced with a number of challenges. However, it is possible to solve most of them. With a well thought and structured program, it is possible to develop the research competency in the medical school curriculum, without risking students' academic performance and achievement of other competencies. Although the preliminary results are positive and encouraging, a more objective evaluation will allow us to discover additional areas of improvement and opportunity.

Keywords

Research, Competencies, Curriculum, Medical school

Notes on Contributor

GREGORIO T. OBRADOR, MD, MPH, is a Dean and Professor of Medicine in the Faculty of Health Sciences and School of Medicine at the Universidad Panamericana in Mexico City, Mexico as well as an Adjunct Assistant Professor of Medicine at Tufts University School of Medicine in Boston, MA, USA.

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