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Original Research

Challenges in the implementation of competencies in the preclinical years of medicine: Academic factors

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ABSTRACT

Objectives: The aim of this study was to describe and analyze the challenges presented in the attempt to change from a traditional teaching of medicine to one that introduced the competencies in basic sciences. **Methods:** For this purpose our interdisciplinary group of teachers designed some strategies and materials that were utilized by professors of five basic disciplines and were evaluated by strengths, weaknesses, opportunities, and threats analysis methodology. Moreover, were presented here as challenges, solutions and what we learned. **Results:** Among the challenges identified we found the predominance of traditional teaching; complexity and duration of the strategies employed; students' opposition to participate in extra-curricular activities, and the need to design appropriate instruments to assess competencies in large groups of students. **Conclusions:** To answer this situation we proposed workshops for teachers in competencies, supervised by experts to achieve a new model of teaching based on competencies.

KEY WORDS: Challenges, competencies, medicine, solutions, teaching strategies

INTRODUCTION

Competence-based education in medicine has followed different paths throughout the world, depending on the school or Faculty of Medicine: In some institutions, curriculum was profoundly changed; in others, competencies were only introduced within their traditional curriculum. Different styles and both general and specific competencies were introduced.

Howe [1] considered that it is important to develop a theoretical framework that integrates both knowledge and attitudes, where learning is impacted by the accumulation of social and cultural hermeneutic experiences and considered it as an important criterion for the adequate teaching of medicine. This author also states that it is essential to guarantee the use of competencies throughout professional life, and suggests: (a) Fostering professional development from the early years of the career; (b) making changes in teaching methods; (c) considering that innovations involve challenges, both in medical practice and in school policy; (d) combating the increased emphasis on bioscience knowledge and the pathological model of medical practice in order to focus on the attitudes and the development of models of learning skills that can be developed and evaluated.

Maudsley and Strivens [2] and Gregory *et al.* [3] considered that collaborative work, professional self-care, and public recognition of the students help them learn how to manage the effective attributes of responsibility towards the patient.

The Faculty of Medicine of the National Autonomous University of Mexico (FMNAUM) modified the curricula, integrating competencies in the subjects programs while retaining the curricula structure. As it has been shown in many instances, there is a general resistance to change by the administrative area, teachers and students. Kligler *et al.* [4] indicated that one of the most difficult challenges to face is that the knowledge,

skills and attitudes should be integrated instead of the reductive approach to knowledge, present in the conventional sciences.

The FMNAUM, after analyzing the curricula competencies of different Medical Schools and Faculties necessary for the profile of a general practitioner, incorporated the next eight competencies in its 2010 curricula Plan [5] traditional subjects: (1) Critical thinking, clinical judgment, decision-making and information management (2) permanent and self-regulated learning (3) efficient communication (4) knowledge and application of biomedical sciences, social medicine and clinical studies in the practice of medicine (5) clinical skills in diagnosis, prognosis, treatment and rehabilitation (6) public health and health systems, promotion of health and prevention of diseases (7) professionalism, ethical and legal responsibilities (8) development and personal growth.

The 2010 curriculum of FMNAUM also favored some educational criteria: (a) Promote communication skills; (b) adapt topics of study to an epidemiological profile; (c) prepare students in the promotion of health; (d) encourage more dedication to individual study than to teaching in the classroom; (e) intensively guide students in problem solving; (f) specify tasks, responsibilities and goals to reach during the different stages of training; (g) define basic aspects for supervision and tutorial teaching, considering emotional and cognitive development of students; and (h) encourage continued independent education by students.

To achieve these goals, it was necessary to design appropriate methods for the evaluation of the independent and self-directed learning. As a result of the in-depth review and analysis of 469 studies, Carraccio *et al.* [6] found that, during the period from 1970 to 1980, there was a greater dedication to the creation of the competencies than to its evaluation, the last being a major challenge that had to be considered. However, creating competencies is not the same as implementing them, and hence that also remains a problem. Lurie *et al.* [7] considered that both, the specific and general competencies have not been properly evaluated and there is no evidence claiming that they can be independently assessed. These authors found some studies that suggested that competencies should be used as a guide to coordinate the efforts of evaluation, but not necessarily for developing specific instruments to measure them, which is an approach that is not shared in all the studies reviewed.

Perhaps the biggest challenge to overcome is to prepare teachers to accept new methodologies and educational strategies and to have the resources required for the implementation of the new curriculum, whose proposal is largely opposed to what they traditionally use. Within the training process of teachers, they must become aware of the presence of the "hidden curriculum" (presence of non-articulated and non- recognized experiences) which is part of the student's formation and which influences him. According to this, a professor's behavioral change is a process that requires a critical control of his/her own experience to help students to organize their own. Learning must result from a reflection on the experience, noting how the individual psychology interacts with the learning environment [1].

Schuwirth and Van der Vleuten [8] suggested that introducing reasoning and judgment strategies to the students during different moments of their career, they can obtain experience through continued practice, enabling them to improve their learning under the supervision and feedback of their teachers. They also noted the importance of teachers who are prepared to be both educators and models, and who stimulate students to acquire skills in solving problems.

However, in the extraordinary development and dissemination of competency programs in medicine the emphasis is on clinical subjects, and there are very few recorded experiences in the pre-clinical period, making it difficult to use them. Therefore, we decided to create strategies, teaching and learning materials that could facilitate competencies development in the early years of the career. It has been suggested that basic courses do not offer students the necessary skills for their clinical training since it promotes knowledge with few examples of clinical conditions. Then, it needed greater flexibility in the courses programs to facilitate active learning and, therefore, more generalization and integration of it [9].

Little has been written about the academic factors that influence the implementation of strategies aimed to the development of competencies in medicine within a traditional curriculum as the one incorporated by FMNAUM [10]. Hence, the purpose of the present research is to describe our experiences (in terms of challenges, solutions, achievements and deficiencies) in the application of the different strategies and materials created to develop competencies defined in the new curriculum of FMNAUM in five subjects from the 1st year of Medical School: Anatomy, Human Embryology, Biochemistry and Molecular Biology, Introduction to Mental Health, and Public Health and Community.

METHODS

Implementation of a program by competencies in basic sciences in the early years of the career of a general practitioner, when the student has little or no contact with hospitalized patients, requires the reformulation of teaching-learning strategies which addresses the non-existent clinical situations. For this reason, a group of six teachers and invited professors was assembled to analyze and describe the difficulties in the implementation of three different exercises in each of the five subjects as well as the solutions used to solve them. These exercises were applied by a total of 30 teachers.

Each teacher applied his competency strategies according to the format that we gave him in three different occasions.

The methodology employed was the qualitative analysis strengths, weaknesses, opportunities and threats [11]. The analysis and assessment of the problems in each of the participating subjects was described in this report as follows: Challenges, implemented solutions and what the team learned. Two areas were considered to be important in the application of competencies: those corresponding to institutional

characteristics; and those corresponding to the implementation itself.

The institutional characteristics were reported in another article [10] and included the application of strategies for competencies development in basic sciences taught in the first 2 years of a school of medicine and that present problems such as:

1. The 1st year students come from a heterogeneous background of public and private schools.
2. The number of students per group (approximately 40 students) and the architectural configuration of the classroom that frequently have fixed tables and chairs.
3. The number of teachers assigned to the implementation of competencies per group (only one or two are present at the same time).
4. The limited access to resources to support the development of strategies and the occasional lack of material for competency-based work.
5. The limited time assigned to classes. Sometimes the subject has a reduced timetable and a great variety of themes to develop.
6. The clinical cases associated with the implementation of competencies in biomedical sciences and physicians at the University facilities are limited. Moreover, teachers lack the time to develop their own. For this study (implementation of the strategies) the situations associated with the institution were taken into consideration by the team.

This research was approved by the Committee for Research and Ethics of the Faculty of Medicine Research Division of the National Autonomous University of Mexico, Project Number 051-2013. Furthermore, all teachers gave their informed consent prior to their inclusion in the study.

RESULTS

Various teaching techniques were applied to implement competencies in the participating subjects during two school years, and results were discussed in monthly sessions to obtain information and propose possible changes that might be needed. The integration of the testimonies received, and their analysis, led the team to classify the information and point out the challenges faced and the results obtained by consensus. The results are directed mainly to determine not the strategies themselves but the difficulties in their implementation, because there are many possible strategies; and no matter which they are, they must be able to implement them at all times according to the subject's program.

The analysis of the observations led to the formation of seven categories; and some of them had to be divided into two or more sections to allow an adequate explanation of their characteristics according to the challenges that were faced.

Constitution of an Interdisciplinary Team to Develop Competency Exercises

Challenge: With the onset of the 2010 curricular plan, it was necessary to study the way to apply competencies in the eight subjects of the 1st year of medical school. Solution: To invite all heads and coordinators of the eight Academic Departments to participate in a team that would apply teaching strategies, using competencies. Only five of the eight subjects: Anatomy, Biochemistry and Molecular Biology, Human Embryology, Introduction to Mental Health and Public Health and Community had a full participation and were responsible for this work. The rest of subjects decided not to participate. What we learned: after reflecting upon the actual participation of the five representatives, it was considered that there were three necessary conditions to be able to function best in a work team: (a) There should be a cordial relationship among its members; (b) that each participant is responsible for performing the tasks assigned; and (c) they should be open to criticism from other members of the group.

The Dynamic Development of Common Strategies

Accepting a general methodology

Challenge: To reach a consensus on the general methodology that would be applied in all five subjects. Solution: After discussion and bibliographic research in articles and books, the group developed a model of exercise that appeared to be best suited to the skills considered appropriate to the basic cycles of the 2010 curriculum as is indicated in its profile for the 1st to years. After the analysis of the model, the group decided not to be so rigid in the development of each exercise and include only certain minimum parameters: (a) Theme definition; (b) educational activity selection; (c) development of students' activities; (d) establishment of professor's activities; (e) evaluation planning, considering the possible application of a pre-test and a post-test, and of instruments to evaluate the competencies [10]. In order to improve the exercises, the team gave feedback to the member that presented his exercise by the analysis of the relevance of the competency and the clarity of the designed exercise, as well as material to be used; they also discussed the methods of assessment suggested and made appropriate corrections. What we learned: All exercises required a certain amount of flexibility to permit each theme to develop according to its difficulty.

Preference of the Traditional System

Changing a way of teaching and learning

Challenge: Students and teachers preferred a traditional system, centered in professor teaching and where students play a passive role, instead of a class based on competencies because the traditional model represents less work for teachers to prepare and evaluate the course. This situation resulted in the rejection or incorrect use of exercises both by teachers and by students. Solution: We proposed that teachers must explain to the students at the beginning of the course that the competencies are directed to help them to become self-sufficient doctors and able to work successfully with a health care team. Regarding the teachers, the group found that it was difficult for the professors lacking teaching skills in competencies to apply the exercises developed by the team, and they easily returned to their

traditional teaching practices. What we learned: It's essential that teachers take an introductory course, so they can be able to understand the relevance of teaching competencies.

Considering the duration of the exercises

Challenge: Some exercises were too long and provoked boredom and disenchantment in the students. Solution: The exercises must, if it is possible, be short and include a variety of strategies to keep the students interested. What we learned: If the exercises are too long, it's better to divide them into subtopics and employ different methods to maintain the interest of the students during the teaching and learning process.

Students Reject Extracurricular Activities that must be performed at Home

Challenge: Medical students should acquire abundant information, as well as a new scientific language and hence they consider that it is a waste of time to do work out of their class schedule, aimed at acquiring independent learning skills, and that does not allow them to study the other courses. Solution: In subsequent exercises we sought to carry out the work skills within class sessions with emphasis on independent learning. And that frequently permitted the teacher to give immediate feedback. What we learned: Techniques that involve a radical change in the learning method should be applied immediately under the supervision of a teacher. Therefore when the teachers learn how to implement a new strategy we believe it will promote self-learning and help the teacher to develop his/her own methodology according to his/her creativity.

Quality of the Materials Employed by Students

Challenge: The students referred that the material of the exercise could be more explicit, or with a greater number of images. Solutions: In subsequent classes, to ensure that student's learning is optimal, the materials must include an introduction to the topic, with enough simple diagrams, digitized if possible, and formatted in a comprehensible language for students. What we learned: Frequently we believe that students understand what we are trying to explain, when there are two problems to consider: Teachers write in a self centered manner and second they don't take into account the characteristics and previous knowledge of the students.

Evaluation Design *ad hoc* for Competitions in Large Groups

Development of instruments of evaluation

Challenge: In looking for evaluation instruments for competencies in basic and social sciences, we found competency assessment tools that were only used in the context of a clinical setting and in small work groups. Solutions: In this case, it was necessary to: (a) Adapt some of the instruments found so they could be used in basic and social sciences; (b) develop simple assessment tools to be gradually integrated considering the programmed degree of complexity of competencies stipulated in 2010 curriculum of the FMNAUM for the first 2 years of the undergraduate level. They were tested and modified or eliminated if they were not useful for large student groups as the FMNAUM has since it is impossible to assess individually all students in 2-h sessions. Also, with a proper organization, the assessment of some general competencies such as communication could be distributed among the participating subjects, so that each teacher could evaluate one aspect of the competency and share results with the other teachers. What we learned: We found that it is necessary to develop appropriate instruments, clear and precise, for the evaluation of competencies in basic and social sciences or in large groups. In addition, competencies can be evaluated in parts if there are communication and agreement between professors that teach different subjects to the same group. On the other hand, since teachers usually require at least one written essay, different skills (not all) can be evaluated through its assessment, such as communication, acquired knowledge, critical reasoning, etc.

Evaluation strategies

Challenge: The students reject assessment parameters that have not been explained and established since the beginning of the course or exercise, especially if these parameters or instruments are new. Solution: We devoted part of the class to explain to students the instrument and its purpose, as well as deliver to them each assessment format (except when it was a knowledge exam). What we learned: To assure the best teacher's participation, it was necessary to supervise the teachers guaranteeing that they would explain to the students clearly what they expected and how they were going to be assessed and providing them with the evaluation instrument beforehand.

Assessments carried out without appropriate ratings

Challenges: While each assessment was a guide to grading each of the students work, many teachers expressed that it was a waste of time and felt that they were also being evaluated on their capacity to decide the grades. Solutions: We spoke with the participating teachers to explain that we had adjusted the assessment instruments to the reality of the different subjects. What we learned: Even when the explanation was given, we obtained two kinds of responses: Some teachers participated responsibly in the assessment. Others continued the assessments as they always did.

DISCUSSION

The present study analyzed the problems and the solutions implemented by a team of professors of FMNAUM in the application of competencies. The results concur with findings, mentioned by Howe [1] who states the relevancy of existing general guidelines applicable to all subjects, with a certain freedom to adapt to each situation. He also considered that the competencies should be initiated at the beginning of the career, with changes in teaching strategies as the student progressed through the years, also considering , in theory, and in practice, innovations and seeking the balance between bio scientific and

the attitudinal areas. With the solution of the different challenges mentioned, results show that this change is possible, and even accepted, despite the resistance of teachers and students of the pre-clinical years. We learned during this study that the implementation of competency-based programs is a slow process.

Within the jurisdiction of the FMNAUM, we have included two of Maudsley and Strivens [2] proposals: (a) On group exercises and (b) on professional personal care. One of the most difficult challenges faced was to change the attitude towards the integration of knowledge, skills and attitudes, instead of following a reductive approach that just includes knowledge [4]. The results obtained in this study showed that this is precisely the central factor of the shortcomings in the implementation of the exercises. This is the basic point of "what was learned," therefore, more counseling for the invited professors, as shown in the different aspects raised by Sanson *et al.* [9].

Even though the FMNAUM analyzed global trends around the emergence of competencies and their use in various faculties and schools of medicine, it was necessary to adapt the methodology used in other institutions to the characteristics of the faculty. This meant that, in the 2010 curriculum of FMNAUM, where subjects were maintained as they were, and competencies were integrated into the teaching methods since the 1st year of the career, the implementation of competencies involved many challenges because it was indispensable to prepare infrastructure and materials, as well as to prepare teachers and students, for the shift in paradigm.

The issues raised in this research showed the problems, solutions and what we learned in the search of the acceptance and implementation of competency-based teaching strategies.

Although it is difficult for teachers to implement such strategies, the majority were more concerned with the evaluation of competencies. To solve this problem, our group developed a series of appropriated instruments for the assessment of skills in the early years of the career. They worked well but could be improved.

This experience showed that the implementation of competencies in a traditionally based curriculum requires: (a) Finding new teaching strategies using competencies for the pre-clinical years; (b) Developing workshops to help teachers to accept competencies and to create their own exercises, according to their teaching style, to promote active participation of students; (c) Offering teachers a closer expert supervision in competencies for helping them to maintain vigilance in the implementation, because changes do not occur rapidly, and it is possible that the teachers begin using competencies and only continue with them if they are convinced of the benefits and as long as it becomes a personal habit.

Finally, the proposal made by Lurie *et al.* [7] to investigate the possibility of developing instruments that simultaneously evaluate several competencies, rather than designing and implementing specific instruments to measure each competency independently must be studied.

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