

Educational and evaluation strategies in the training of physician specialists

Verónica Alejandra Gaona-Flores¹, Luz Arcelia Campos-Navarro², Jesús Arenas-Osuna³ and Enrique Alcalá-Martínez¹

¹Infectology Hospital; ²General Hospital; ³Specialty Hospital Centro Médico Nacional La Raza, Ciudad de México, Mexico

Abstract

Background: Teaching strategies have been defined as procedures, means, or resources that teachers used to promote meaningful learning. **Aim:** Identify teaching strategies and evaluation used by the professor with residents in tertiary hospitals health care. **Methods:** This is a cross-sectional study conducted with full, associate, and assistant professors of various medical specialties. A questionnaire was applied to evaluate the strategies used by professors to teach and evaluate students. **Results:** We included a sample of 90 professors in 35 medical specialties. The most frequent teaching activities were organizing students to develop presentations on specific subjects, followed by asking questions on previously reviewed subjects, in terms of the strategies employed, the most frequent "always" option was applied to case analyses. The most frequent methods used for the evaluation of theoretical knowledge were participation in class, topic presentation, and examinations. **Conclusions:** Teaching activities were primarily based on the presentation of specific topics by the residents. The most commonly used educational strategies were clinical case analyses followed by problem-based learning and the use of illustrations. Evaluation of the residents' performance in theory knowledge, hinged on class participation, presentation of assigned topics, and examinations.

KEY WORDS: Education. Medical education. Educational strategies. Learning assessment.

Introduction

Clinical teaching directly involves patients and constitutes the core aspect of education in the field of health. The teaching-learning process in medical education is highly important; it is from it that the trainee doctor obtains abilities to solve the problems posed by medical care¹.

Thus, this learning focuses on real problems in the context of professional practice and, this way, students are motivated by their participation in the solution of these problems. Typical teaching involves the supervision of the student on training by a clinician

with greater experience; generally, this involves the resident with the highest hierarchy or the assistant professor, which results in a wide variety of teaching styles. An important aspect to be highlighted in this scenario is that an important part of teaching is obtained from the example offered by the teachers of that moment².

In the face of resident physicians' expectations, which are multiple, it would appear that an efficacious teacher is that who is able to satisfy the students' academic needs. The resident's performance depends on conditions that the teacher must know how to recognize and identify; some factors are the curricular

Correspondence:

Verónica Alejandra Gaona-Flores
Jacarandas y Seris s/n
Col. La Raza, Azcapotzalco,
C.P. 02990, Ciudad de México, México
E-mail: vgaona2@yahoo.com.mx

Date of modified version reception: 09-05-2016
Date of acceptance: 09-05-2016
DOI: 10.24875/GMM.M17000030

Gac Med Mex. 2017;153:459-465
Contents available at PubMed
www.gacetamedicademexico.com

ones and those associated with the student's learning style. Teaching style is conceptualized as the behavior, the teacher exhibits at each phase or moment of the teaching activity, which is founded on personal attitudes that are characteristic of him/her, that have been abstracted from academic and professional experience, that do not depend on the contexts where they are shown, and that can increase or decrease inconsistencies between teaching and learning³. These elements make up a teaching and learning style; we cannot determine only one style of one or the other; generally, it is heterogeneous and even changes with each student, classroom or clinical situation. This behavior is dynamic since teaching implies knowing the student, his/her personality, his/her intelligence, his/her intellectual, and emotional strengths or weaknesses, the reasons that guide his/her learning, and this enables the teacher to create an appropriate atmosphere for the process of learning and teaching⁴.

There is no ideal teaching style that is agreeable to all students since the relationships between teaching styles and learning are complex and there is substantial individual variability.

Teaching strategies have been defined as procedures, means, or resources that the teacher uses in a reflexive and flexible form to promote the achievement of meaningful learning. It is important to identify that didactics is conditioned by the specificity of the specialty's own curriculum⁵. In a consecutive form in the teaching-learning process, there is evaluation, understood as a variable that supports, among others, the teacher's own criteria in the evaluation of learning, coherence, or academic feedback^{6,7}.

Some studies have been conducted on the relationship between the teacher's teaching style and students' learning style. It stands out that each student has a learning style of his/her own that is independent of the faculty teaching style, and that is not directly related to student performance, although it has been possible to identify that they prefer teaching methodologies that are more student-centered⁸. Another publication identified that fortifying the residents' attitude and motivation to study is required, and thereby offering courses on study techniques^{9,10}.

Evaluation is a teaching strategy that allows for the educational process to be verified. In general, it is carried out by means of observation and student-teacher interrelation in clinical practice to subsequently qualitatively or quantitatively express the obtained result; this appears as a challenge for the teacher. For the evaluation to be interpreted, the goals to be

achieved by the student should be defined, and the objectives of the course to achieve the performance skills have to be reported.

The diagnostic, summative, and formative evaluation is the formal evaluation that has to be carried out through evaluation formats or instruments, even with checklists that facilitate the recording of information obtained for each student in the field of cognitive, procedural, and attitudinal competencies^{11,12}.

Under these elements, arose the research question for this study, which are the educational and evaluation strategies by means of which specialist physicians are trained at tertiary care hospitals from a national medical center? Thus, our objective was to identify the teaching and evaluation strategies a teacher uses with residents at tertiary care hospitals.

Methods

This was a descriptive, cross-sectional observational study that was carried out at the Centro Médico Nacional La Raza from January to June 2015 with full, associate, and assistant teachers of different medical specialties who agreed to participate; they were verbally invited by reading an informed consent script to answer a questionnaire on the educational and evaluation strategies used with residents. The meeting place to apply the questionnaire was the hospital auditorium, and it took them approximately 10 min answering it.

The instrument was provided by the author of a study conducted at the Faculty of Dentistry of the Universidad Nacional Autónoma de México. The result of the internal consistency analysis with Cronbach's alpha was 0.880, which established that the instrument was reliable. It was composed of three sections assessing the strategies used by the professor for teaching and the form to evaluate the students. The discrimination of responses was through scores in a Likert-type scale with four options: never, almost never, almost always, and always¹³.

Statistical analysis

Descriptive statistics were carried out with absolute numbers and percentages.

Ethical aspects

The study was submitted to the Instituto Mexicano del Seguro Social (IMSS) Local Committee of Health Research. According to criteria of the General

Statutes of Health in Matters of Health Research Rulebook, second title “On ethical aspects of research in human beings,” only chapter, article 17, subsection I, and the protocol is regarded as risk-free research. Moreover, according to the rule that establishes the regulations for health research at the IMSS, “personnel that perform health research activities at the IMSS should carry them out with adherence to national and international ethics codes.”

Results

A total of 101 questionnaires were handed out (Appendix I) and 90 were returned, which were the total sample, out of which 56.7% were assistant, 24.4% were associate, and only 18.9% were full professors. As for medical specialties, those that participated in larger number were internal medicine with 12.2%, medical pediatrics with 8.9%, otorhinolaryngology with 7.8%, pediatric cardiology with 6.7%, and pulmonology with 5.6% (Table 1).

With regard to the question about the teaching activities most often practiced by the teacher, these were organizing the students for the presentation of topics, 52.2% answered that always, followed by asking questions about previously addressed subjects, with 44.4% always doing it. Of the same question, the option “never” was more commonly observed for dictation, with 82.2%, followed by asking the students to discuss subjects previously exposed by the teacher, with 43.3%.

In the question referring to educational strategies used by teachers, the most common “always” choice was for analysis of cases with 55.6%, followed by problem-based learning with 42.2%, and at third place illustrations with 15.6%. In this same question, the “never” answer was chosen more frequently for simulation with 41.1%, summaries with 34.4%, and advance organizers with 25.6%.

With regard to the answers to the question referring student performance evaluation, the most widely used evaluation methods were found to be participation in class (65.6%), exposition of topics by students (57.8%), and examinations (46.7%). Evaluation strategies that were never used included the resolution of study guides (45.6%), extra-class works (26.7%), and conceptual maps (16.7%) (Table 2).

Discussion

Teaching activities are an essential element of the learning process. The training of the specialist

Table 1. Participating physicians by specialty

Specialty	No.	%
Internal medicine	11	12.2
Medical pediatrics	8	8.9
Communication-audiology	7	7.7
Otoneurology		
Otorhinolaryngology	7	7.8
Pediatric cardiology	6	6.7
Pulmonology	5	5.6
Anesthesiology	4	4.4
Rheumatology	4	4.4
Pediatric rheumatology	3	3.3
Anatomic pathology	2	2.2
Dermatology	2	2.2
Medical genetics	2	2.2
Critical medicine	2	2.2
Neonatology	2	2.2
Neurology	2	2.2
Ophthalmology	2	2.2
Clinical pathology	2	2.2
Urology	2	2.2
Other clinical specialties	17	18.9

physician demands for certain abilities to be acquired according to the specialty, which is accomplished by in principle using and making the most of the student’s previously acquired mental processes, habits, and attitudes with regard to study, in addition to adapting to the learning style and the faculty teaching style throughout the specialty training^{14,15}.

In this study, as other authors have done, a wide variation between teaching styles was identified; in light of this, heterogeneity in the quality of teaching is likely to be found¹⁶. We have to identify the importance of balancing the relationship between what is taught and how is it learnt by physicians; i.e. the content in contrast with the process. This way, it is important for the learning strategies that predominate for the group of physicians, both students and teachers, to be identified¹⁷.

In this work, we found that most teachers organize the students in order for them to prepare and expose topics and that they ask questions about previously addressed subjects.

Educational strategies referred as “always” or “almost always” being used include conceptual maps, synoptic charts, and diagrams. Analysis of clinical cases and problem-based learning stood out, suggesting that the results of this strategy will be the product of the experience acquired over the years of previous training, where theory can be applied in the clinical field, with an addition of knowledge on precedents being made through activities such as

presenting and developing subjects of the curriculum. This way, in the sessions with clinical cases, the analysis of those residents with larger number of years of study in the specialty has a better profile.

For this study, we resorted to the instrument used by Espinoza-Vázquez et al.¹³, who reported, unlike this work, that teachers in their study preferred exposing topics and asking questions on addressed subjects, and among their teaching-learning strategies, they

Table 2. Teaching-learning methods used by medical teachers

In the courses, you teach, indicate how often do you	Never No. (%)	Almost never No. (%)	Almost always No. (%)	Always No. (%)
Carry out the following activities				
I expose topics	21 (23.3)	30 (42.2)	26 (28.9)	4 (4.4)
I organize the students to expose topics	1 (1.1)	7 (7.8)	35 (38.9)	47 (52.2)
I dictate	74 (82.2)	13 (14.4)	1 (1.1)	2 (2.2)
I organize group dynamics	6 (6.7)	18 (20)	45 (50)	20 (22.2)
I ask questions about previously addressed subjects	2 (2.2)	4 (4.4)	41 (45.6)	40 (44.4)
I ask the students to discuss topics previously exposed by me	39 (43.3)	13 (14.4)	21 (23.3)	15 (16.7)
I ask the students to discuss based on previous readings	12 (13.3)	9 (10)	42 (46.7)	27 (30)
Do you use the following teaching strategies?				
Advance organizers	23 (25.6)	32 (35.6)	28 (31.1)	7 (7.8)
Summaries	31 (34.4)	34 (37.8)	20 (22.2)	5 (5.6)
Conceptual maps	14 (15.6)	19 (21.1)	47 (52.2)	9 (10)
Illustrations	17 (18.9)	28 (31.1)	31 (34.4)	14 (15.6)
Diagrams	16 (17.8)	23 (25.6)	40 (44.4)	11 (12.2)
Synoptic charts	15 (16.7)	29 (32.2)	36 (40)	10 (11.1)
Analogies	22 (24.4)	27 (30)	30 (33.3)	9 (10)
Demonstrations	17 (18.9)	25 (27.8)	31 (34.4)	16 (17.8)
Problem-based learning	2 (2.2)	3 (3.3)	47 (52.2)	38 (42.2)
Analysis of cases	0	1 (1.1)	38 (42.2)	50 (55.6)
Simulation	37 (41.1)	26 (28.9)	20 (22.2)	7 (7.8)
To evaluate the performance of your students in theoretical aspects, do you employ the following procedures?				
Extra-class works	24 (26.7)	35 (38.9)	22 (24.4)	9 (10)
Evidence portfolio	14 (15.6)	25 (27.8)	34 (37.8)	16 (17.8)
Examinations	0	14 (15.6)	34 (37.8)	42 (46.7)
Conceptual maps	15 (16.7)	19 (21.1)	45 (50)	11 (12.2)
Exposition of topics by students	0	4 (4.4)	34 (37.8)	52 (57.8)
Participation in class	0	2 (2.2)	28 (31.1)	59 (65.6)
Resolution of study guides	41 (45.6)	31 (34.4)	9 (10)	8 (8.9)

use demonstrations, illustrations, and analysis of cases; with regard to evaluation, they choose participation in class and multiple choice examinations.

Other authors emphasize that strategies, by themselves, do not directly lead to academic success, but the motivation, the student chooses his/her learning with is a necessary and influential condition, as well as the teacher's academic attitude^{18,19}.

It is essential for the student to reflect on the obtained information, to critically analyze it; it is not enough for him to acquire information since its interpretation allows identifying the teaching-learning process and evaluation constituted as an integral element of this process¹⁸. The performance of knowledge examinations and individual feedback has helped medical students on their self-regulation cycle and the teacher to carry out the evaluation of the entire educational process, to dynamically modify, if necessary, the used strategies²⁰⁻²².

The authors of this study identified that evaluation was circumscribed to assessing the command of specialty-specific knowledge. In contrast, in the evaluation by competencies, in addition to considering this proficiency, the development of performance on the cognitive, attitudinal, and affective-motivational dimensions is also appraised, for which purpose initially defining the competency between that what has been learnt and that what can be accomplished has been proposed^{12,23}.

This way, in the link between the teacher and student's participation, the latter, to study a medical specialty, is required to already be a graduated health professional, with learning strategies of his/her own, and should adapt to the teacher's educational strategies. We also cannot exclude that current generations' students use technological tools that significantly influence on their knowledge, at least on immediate learning. This way, it is important for technological access and abilities students possess to be linked with teachers' teaching style, thus facilitating the learning process and acting as a role model²⁴. It is not enough thinking that we are doing things right, but we have to put them to test. Accepting the limitations in the results is the first step in defining strategies to improve the educational process, students' clinical refinement, patient safety, and health-care quality. This change appears to be associated with advanced teaching training, and this strength is most likely the way to improve postgraduate educational processes. Moreover, the thing is that, within the field of medicine, investigators have recognized the importance of self-regulation for

effective clinical practice^{22,25,26}. With a participative vision, favoring students' motivation, triggering and channeling initiative, and inventiveness is sought by promoting an experience mediated by critical thought in the generation of knowledge; it is a process where both teacher and student interact, enrich each other and generate and transform knowledge.

One aspect identified as a weakness in this study was the fact that, among the teachers of medical specialties who participated in this research, those involved with clinical areas predominated over those with surgical specialties. With the obtained results, we interpreted that they pay more importance to practice with the analysis of clinical cases, which were identified as an educational strategy over activities such as asking questions with regard to previously addressed subjects.

In this 21st century, there is another challenge that remains to be addressed: setting out some considerations for reflection and alternatives of action around teaching in medical specialties. In the face of growing concerns for patient safety in the hospital setting, questionings have arisen on how efficacy is acquired from health-care professionals' practical experience. Currently, there is simulation-based education by means of technological equipment with educational technologies that have proven to be efficient in promoting the generation of knowledge²⁷, without this stopping the teacher-student interaction to exist.

Acknowledgments

To all medical teachers who contributed with their time and answers to this study.

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Appendix 1. Questionnaire on educational and evaluation strategies identification.

Mark your answer with an X in the box corresponding to each question

Appointment		Years as professor	
Full professor	<input type="text"/>	1-5 years	<input type="text"/>
Associate professor	<input type="text"/>	5-10 years	<input type="text"/>
Assistant professor	<input type="text"/>	11-15 years	<input type="text"/>
		15-20 years	<input type="text"/>
		More than 20 years	<input type="text"/>

Specialty

In the courses, you teach, indicate how often do you carry out the following activities

	Never	Almost never	Almost always	Always
a) I expose topics	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
b) I organize the students to expose topics	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
c) I dictate	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
c) I organize group dynamics	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
d) I ask questions about previously addressed subjects	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
e) I ask the students to discuss on topics exposed by me	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
f) I ask the students to discuss based on previous readings	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

How often do you use the following teaching strategies in the courses you teach?

	Never	Almost never	Almost always	Always
a) Advance organizers	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
b) Summaries	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
c) Conceptual maps	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
d) Illustrations	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
e) Diagrams	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
f) Synoptic charts	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
g) Analogies	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
h) Demonstrations	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
i) Problem-based learning	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
j) Analysis of cases	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
k) Simulation	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

To evaluate your students' performance in theoretical aspects, indicate how often do you employ the following procedures

	Never	Almost never	Almost always	Always
a) Extra-class works	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
b) Evidence portfolio	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
c) Examinations	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
d) Conceptual maps	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
e) Exposition of topics by students	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
f) Participation in class	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
g) Resolution of study guides	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>