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Gac Med Mex. 2017;153:4-12

GACETA MÉDICA DE MÉXICO **ORIGINAL ARTICLE**

Diagnostic and formative assessment of competencies at the beginning of undergraduate medical internship

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Abstract

Introduction: *Research on diagnostic and formative assessment competencies during undergraduate medical training is scarce in Latin America.* **Objective:** *To assess the level of clinical competence of students at the beginning of their medical internship in a new curriculum.* **Methods:** *This was an observational cross-sectional study in UNAM Faculty of Medicine students in Mexico City: a formative assessment of the second class of Curriculum 2010 students as part of the integral evaluation of the program. The assessment had two components: theoretical and practical.* **Results:** *We assessed 577 students (65.5%) of the 880 total population that finished the 9th semester of Curriculum 2010. The written exam consisted of 232 items, with a mean of 61.0 ± 19.6, a difficulty index of 0.61, and Cronbach's alpha of 0.89. The mean of the objective structured clinical examination (OSCE) was 62.2 ± 16.8, with a mean Cronbach's alpha of 0.51. Results were analyzed by knowledge area and exam stations.* **Conclusions:** *The overall results provide evidence that students achieve sufficiently the competencies established in the curriculum at the beginning of the internship, that they have the necessary foundation for learning new and more complex information, and integrate it with existing knowledge to achieve significant learning and continue their training.* (Gac Med Mex. 2017;153:4-12)

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KEY WORDS: *Undergraduate medical education. Formative assessment. Summative assessment. Competencies. OSCE.*

Introduction

The UNAM Faculty of Medicine has more than 400 years as one of the most important physician training centers in Latin America. In addition, it has introduced internationally innovative disciplinary fields of knowledge in the training of the new generations. An example of this was the integration of the *Biomedical informatics*[1] subject on the relatively recent important curricular change known as 2010 Curriculum[2].

The 2010 Curriculum is organized by categories, with a focus on competencies. "Competence" is defined as a cluster of knowledge, skills, attitudes and

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Date of reception: 11-01-2016
Date of acceptance: 05-02-2016

values that, interrelated, enable an efficient professional performance, in accordance with the state-of-the-art. The graduate student profile was established by competencies in the Curriculum, which was approved by the Faculty of Medicine Technical Board on September 17, 2008. The graduation profile was defined in terms of 8 competencies: 1) critical thought, clinical judgment, decision-making and management of information; 2) self-regulated and permanent learning; 3) effective communication; 4) knowledge and application of biomedical, socio-medical and clinical sciences in the practice of medicine; 5) diagnostic, prognostic, treatment and rehabilitation clinical skills; 6) professionalism, ethical aspects and legal liability; 7) population health and health system: health promotion and disease prevention; and 8) personal development and growth[2].

The student has to advance across 4 sequential training phases, and gradually achieve the intermediate profiles with the same 8 competencies of the graduation profile, with an increasing level of complexity. The 2010 Curriculum second undergraduate class has completed the second phase (5th to 9th semesters), comprised by 40 courses.

The assessment –understood as "a generic term that includes a range of procedures to acquire information on the student's learning and the formation of value judgments about the learning process…"[3]– involves a systematic information collection process through different instruments with validity evidence in order for decision-making to be based on the teaching and learning process.

The assessment can be formative, as the type used to monitor the learning process, and provide feedback to the student about his/her achievements, deficiencies and opportunities for improvement[4], which allows for those that are done correctly to be identified, in order to continue doing them so, as well as those with some deficiency, to detect them on time and correct them. These assessments send messages to the students that might drive them to learning forms that are more effective and consistent with the curriculum[5].

The assessment can be diagnostic when it is carried out at the beginning of a course or academic activity with the purpose to determine the student's level of knowledge, skills or attitude. This information is highly useful for the teacher, since it allows for him/her to make adaptations in the content and in programmed academic activities' implementation. It also evaluates the behavior of a curriculum and is highly useful to improve academic programs, to compare the obtained results and acquired competencies with established curricular objectives, to verify the level of achievement of the corresponding profiles, to detect strong and deficient fields of knowledge, and to provide the results obtained in the diagnostic exam to the corresponding entities and to the students in order for an adequate feedback to occur.

The purpose of the present study was to assess the level of clinical competence of students initiating undergraduate medical internship (10th semester) by means of diagnostic, formative, theoretical and practical assessment according to the 2010 Curriculum Intermediate Profile II.

Methods

Educational setting and participants

The UNAM Faculty of Medicine is a public institution based on Mexico City that currently has more than 15,000 undergraduate and postgraduate students. It is the largest medical school of the country. The Curriculum has 8 generic competencies, defined in the Graduation Profile and with different levels of complexity throughout the program, also defined on Intermediate Profiles I and II, at the end of second year and 9th semester of the undergraduate program, respectively[2]. The comprehensive plan to assess the program, approved by different UNAM collegiate entities, established that, at the end of Intermediate Profiles I and II, a diagnostic and formative assessment should be carried out where, using different instruments, the acquired knowledge and competencies would be evaluated at the end of each phase of the curriculum. This report corresponds to the first assessment made of Intermediate Plan II in the Faculty of Medicine, to the generation of students admitted in 2011 and who successfully approved the subjects to be admitted to undergraduate medical internship (10th and 11th semesters of the program).

Study design

A cross-sectional, observational study was carried out, with knowledge and competencies assessment instruments that were specifically designed for Intermediate Profile II.

Theoretical assessment structure

A knowledge general exam was designed, with single-answer multiple-choice questions in a written form,

Table 1. Theoretical exam contents by area of knowledge, percentage of used items and subjects corresponding to each area

Areas of knowledge	Percentage	Subjects
Area 1: Internal Medicine	39.6	Algology; Cardiology; Dermatology; Endocrinology; Therapeutic pharmacology; Gastroenterology; Geriatrics; Hematology; Infectology; Nephrology; Pneumology; Neurology; Human nutrition; Psychiatry; Rehabilitation; Rheumatology
Area 2: Surgery	13.2	Surgery and medical emergencies; Ophthalmology; Otorhinolaryngology; Orthopedic medicine; Urology
Area 3: Obstetrics and gynecology	7.2	Obstetrics and gynecology
Area 4: Pediatrics	8.8	Clinical genetics; Pediatrics
Area 5: Socio-medical	9.6	Anthropology and interculturality; Medical bioethics and professionalism; Clinical epidemiology and evidence-based medicine; History and philosophy of medicine; Forensic medicine; Psychological medicine and communication; Environmental and workplace health
Area 6: Propedeutics	12.8	Medical propedeutics and pathophysiology
Area 7: Diagnostic process/Paraclinical	8.8	Anatomic pathology I; Anatomic pathology II; Imaging; Clinical laboratory

following international recommendations for an instrument of this nature[6]. The table of specifications was created according to 2010 Curriculum Intermediate Profile II in order to develop the theoretical exam, which included knowledge on the Clinical and Socio-medical areas. The credit value of each course was taken into account from the 5th to the 9th semester and, by expert consensus, they were integrated in 7 areas of knowledge, as shown in table 1. Academic Departments were requested items for each one of the courses from the 5th to the 9th semester, with the courses' programs and essential knowledge the student must possess to understand the Curriculum undergraduate internship academic contents and clinical practice being considered. Subsequently, item selection and adjustment was carried out by a group of evaluation experts, taking care of the content validity and disregarding those not meeting the criteria proposed by Haladyna et al.[7]. Finally, the test was comprised, according to the specification table, by 232 independent, multiple-choice items and with 4 answer options (Table 1).

The assessment was carried out by computer at the Center of Computerized Evaluation of the Faculty of Medicine in Tlatelolco, and an answer time of 0.96 minutes was given per item. There were 450 computers available, and two 4-hour shifts were therefore established, with measures being taken to decrease the possibility of communication between both student shifts. In informative meetings prior to the exam, the students were invited to voluntarily participate. The exam was carried out on Wednesday October 14, 2015, from 8:00 to 12:00 h and from 13:00 to 17:00 h.

For the theoretical test psychometric analysis, the ITEMAN V.4 software was used (Assessment Systems Corporation; www.assess.com), with the classical test theory model. Items with inadequate psychometric characteristics (items with negative discrimination and possible double answer) were eliminated from the original instrument. Overall results, by area and by subject, are presented with data obtained from this version of the instrument.

Practical assessment structure

The objective structured clinical examination (OSCE) included attributes of six competencies of the 2010 Curriculum Intermediate Profile II. A table of specifications was created according to the above-mentioned profile, and collaboration was requested from academic departments in the development of standardized stations, especially considering the skills a student must possess at the completion of the undergraduate program 9th semester. Professors of the Faculty of Medicine with experience in the development of OSCE stations for formative and summative assessments participated in the entire process. Subsequently, stations' selection and adaptation were carried out by assessment experts, who developed the support material for each station, including clinical scenarios' summaries,

Table 2. OSCE stations and their relationship with 2010 Curriculum intermediate profile II competencies

Circuits	Subject	Competencies*
1	Anorexia	3, 4, 5, 6, 7
2	Growth and development	3, 4, 5, 6, 7
1	Pyelonephritis	3, 4, 5, 6, 7
2	Abdominal pain (appendicitis)	
1	Unwanted pregnancy	3, 4, 5, 6, 7
2	Anguish	3, 4, 5, 6, 7
1	Diarrhea	3, 4, 5, 6, 7
2	Abdominal pain (hepatitis)	3, 4, 5, 6, 7
1	Pharyngeal pain	3, 4, 5, 6, 7
2	Fever-headache	3, 4, 5, 6, 7

*3: Effective communication; 4: Biomedical, socio-medical and clinical sciences knowledge and application in medical practice; 5: Diagnostic, prognostic, treatment and rehabilitation clinical skills; 6: Professionalism, ethical aspects and legal liability; 7: Population health and health system: health promotion and prevention of disease.

rubrics with global scales and scripts for standardized patients. Once the instruments were available, a pilot test was carried out in order to be able to make relevant adjustments, which was conducted in primary care units in order to have a realistic context.

Non-sick persons were used in the stations (medical interns on Social Service), who were trained to consistently enact a health problem as standardized patients. The OSCE ended up comprised by 5 standardized stations of 12 minutes each in 2 simultaneous circuits. The topics of each station and their relationship with competencies are specified in table 2. Informative meetings were held with the students who were invited to voluntarily participate, and confidentiality of their results was maintained.The students were assessed in an objective and structured form at each station by means of rubrics with predefined global scales developed by experts on the area and validated in the pilot test. The result per station is reported as the percentage of correct answers in the aforementioned instruments. To obtain the percentage of correct answers, the instrument employed to assess each station has a 9-indicator evaluative scale with 4 possible scores for each element, which ranges from 1 (insufficient) to 4 (excellent); each indicator has a particular weight percentage depending on the clinical competence attribute assessed at each station, and the nine indicators together add up to a total possible of 100%. The five stations percentage average of each circuit determines each examinee's global score. This allows for better feedback of the participants within the educational context, by being able to easily translate the global result into a 100-point scale (Table 2).

The OSCE was applied to 523 (59.4%) out of 880 registered examinees. It was carried out at 8 simultaneous primary care clinical sites, with an average of 65 students per site. Total number of assessors was 176 teachers from different academic departments and who were previously trained; average number of assessors per site was 22. The examination was carried out on Saturday October 10, 2015, from 8:00 to 17:30 h, in six 1-hour shifts.

Each student's results were captured in optic-reader sheets designed for that purpose, at each one of the stations where they rotated. For the theoretical and practical assessment phases, descriptive statistics tests were performed (mean and standard deviations), which were analyzed with the statistical package JMP version 8 (SAS Institute; www.jmp.com), with Cronbach's alpha test being used and generalizability being analyzed with the G-theory[8].

Reporting

With the theoretical and practical assessment results, reports were made for different populations, with relevant information for each one of them: for the Faculty of Medicine officials, for Academic Departments and an individual report for each student. In the individual feedback report for students, their results in the knowledge assessment for each one of the seven areas of knowledge (Internal medicine, Surgery, Obstetrics and gynecology, Pediatrics, Socio-medical, Propedeutics, Diagnostic/paraclinical processes) and globally, were quantitatively and visually described, with the student score and overall average of the class written down in a scale transformed from 500 to 1500. In addition, the transformed score was presented for practical evaluation of each one of the assessed stations and competencies, with the student's score and the class overall average also written down. The individual report was confidentially handed over to each student who participated in the study.

Ethical aspects

The project is part of the UNAM Faculty of Medicine medical degree program 2010 Curriculum Assessment and Updating Plan, which was approved by relevant

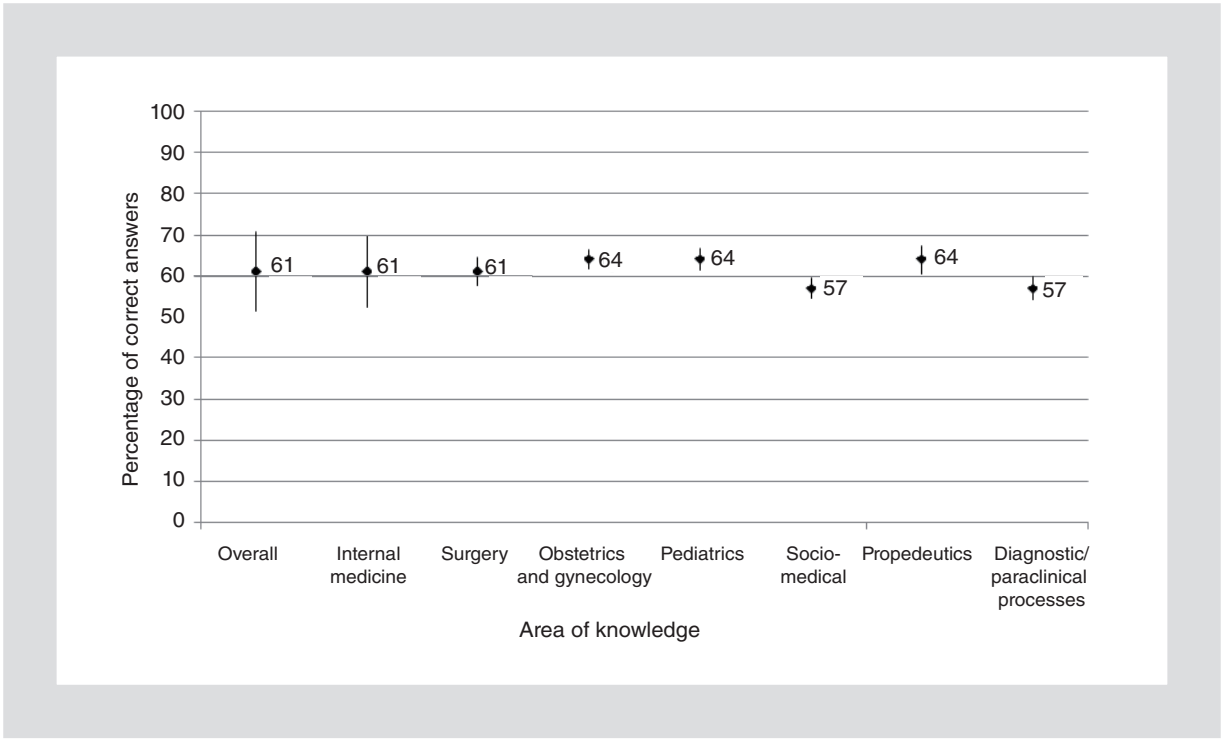

Figure 1. *Results obtained by the students (n = 577) on the theoretical phase, as the average of correct answers and per area of knowledge. Vertical lines represent the standard deviation.*

collegiate entities. The assessment strategies of this Plan include applying Intermediate Profiles' diagnostic and formative assessments on theoretical and practical aspects, which are part of curricular evaluation quality assessment and improvement. Student participation in the study was voluntary. For the purposes of the present work, individual identifiers were eliminated; only aggregated results are presented, with students' anonymity being maintained in the development of the manuscript.

Results

Theoretical exam results

Total number of students who took the Theoretical Exam was 577 (65.5%) out of 880 registered who successfully completed 2010 Curriculum 9th semester modules. The psychometric analysis of results was performed with the Iteman program, with the classical test theory model, as described in *Method*. Eighteen items were eliminated (7.2% of a total of 250) from the original instrument due to inadequate psychometric characteristics, with the final assessment instrument being comprised by 232 selected items. The results are presented with data obtained with this version of the instrument. When items were refined, psychometric characteristics of the instrument were improved, including discrimination and Cronbach's alpha. Mean theoretical phase correct answers (difficulty index) was 61 ± 19.6 (mean ± standard deviation), discrimination (point-biserial correlation coefficient) was 0.18, reliability with Cronbach's alpha was 0.89, standard error of measurement was 6.4, and correct answers minimum and maximum values were 73 and 194, respectively.

Figure 1 shows that the areas of knowledge with the highest scores were Obstetrics and Gynecology, Pediatrics and Propedeutics, in contrast with Socio-medical and diagnostic/paraclinical processes, which obtained the lowest scores.

Practical phase results

The OSCE was applied to 523 students (59.4%) out of 880 registered; 54 of those who attended the theoretical exam, failed to do so to the practical phase. Overall OSCE correct answers percentage mean was 62.2, with standard deviation of 16.8. With regard to reliability, the instrument had a Cronbach's alpha of 0.51 considering both circuits (circuit 1: 0.51; circuit 2:

Table 3. Results obtained by the students on the practical phase, by OSCE clinical competence attributes

	Interrogation	Physical examination	Laboratories	Diagnoses	Therapeutics	Communication	Patient
Mean	66.9	57.3	52.8	58.4	55.5	72.2	68.6
Standard deviation	21.5	24.8	26.1	23.6	24.3	20.6	21.7
Median	75.0	50.0	50.0	50.0	50.0	75.0	75.0

Table 4. Results obtained by the students on the practical phase by circuit 1 and 2 stations (n = 523)

Station	Circuit 1			Circuit 2		
	Competence	Mean	Standard deviation	Competence	Mean	Standard deviation
1	Anorexia and undernourishment	61.9	16.7	Growth and development	58.3	17.9
2	Pyelonephritis	62.6	16.5	Abdominal pain, appendicitis	65.8	17.4
3	Unwanted pregnancy	67.5	15.7	Anguish	64.0	13.7
4	Diarrhea	61.7	14.8	Abdominal pain, hepatitis	58.5	18.1
5	Pharyngeal pain	65.9	15.6	Fever, headache	54.8	17.1

0.49). Using the generalizability theory model, the G-coefficient was 0.60.

With regard to the results for clinical competence attributes, the highest are observed to have been obtained on communication and interrogation skills attributes (Table 3), in contrast with the attribute with the lowest assessment, which was laboratory and imaging tests interpretation.

The Unwanted pregnancy station obtained the highest score (67.5); in contrast, the Fever-headache station was the one with the lowest score (54.8), as observed in table 4.

Discussion

This is the second investigational study to report the level of competence achievement of UNAM Faculty of Medicine 2010 Curriculum undergraduate students[9]; in this case, the next phase of the program, which concludes just prior to entering the internship. To the best of our knowledge, this is the first study in Latin American literature to diagnostically and formatively assess students at the beginning of medical internship in a competence-focused curriculum. This work met a double purpose: on one hand, verifying that the profile proposed in the curriculum was achieved, and on the other, assessing student competencies.

About the theoretical phase

The fact that the general knowledge exam followed the phases proposed by Downing and Yudkowsky[4], and by Haladyna et al.[7], allows for inferences with high degree of validity to be made. In the subsequent analysis, 7.2% of items were eliminated, which is appropriate for an exam with high consequences and better yet if it is a diagnostic and formative exam, as in our case, and Cronbach's alpha value is 0.89, which corresponds to high internal consistency.

Student assessment prior to undergraduate medical internship admission showed that, of the 7 areas of knowledge assessed, 5 had a percentage of correct answers higher than 6 and 2 remained below of this value (socio-medicine and paraclinical diagnosis). The results of another year class with a similar exam, but with knowledge of the 2 first years being assessed (phase I), showed something similar[9], since subjects included in socio-medical areas also had percentages lower than 6, although we should take into account that the evaluated theoretical content is different and, therefore, the assessments are not entirely comparable.

It should be noted, for an adequate interpretation of results, that there was no previous preparation for this diagnostic and formative exam, and some clinical subjects were studied in the 6th and 7th semesters, and

others, such as Gynecology and Pediatrics, were addressed in the 8th and 9th semesters, which could be considered an advantage to recall the contents that were most recently acquired; as it can be appreciated, the highest values were for both these clinical disciplines and for Propedeutics, which is revisited throughout all courses.

One study in Wayne University, in Detroit (Michigan, USA)[10], in third-year students, on the retention of first year-imparted genetics knowledge, where knowledge application was assessed, did not find any correlation between first-year theoretical exam results and the OSCE applied at third year, as we report in the present study. In another study carried out in sixth-year medical students of the University of Rwanda[11], where knowledge and skills retention was assessed after imparting an intensive training course on obstetric-gynecologic emergencies, assessments were made before initiating the course, immediately after taking it, and at 3 and 9 months. The area that was observed to have the highest levels of recall failures corresponded to clinical skills, similar to what we observed in our students, since out of 6 clinical competence attributes, they obtained values lower than 60% in 4.

The areas that had the lowest averages were the socio-medical and paraclinical diagnosis areas. In the case of the socio-medical area, it had already been of the lowest ones in previous phase intermediate profile, and it is therefore likely that the students consider that the contents lack clinical relevance and this being the reason for higher failure to recall in comparison with biomedical disciplines, or because of learning being out of context or lack of knowledge reinforcement[12,13]. It is also probable that complementing the assessment in this area is required, since assessing it with multiple-choice instruments has been acknowledged to be difficult[14]. With regard to the low averages observed for paraclinical diagnosis (which comprises anatomical pathology, imaging and clinical laboratory), these are domains that have already been documented as being poorly addressed in other medical schools' curricula[15,16], especially due to poor integration of their contents with the rest of medical subjects. In the case of radiology, in recent high-consequence exams at the UNAM, it was also an area with low values when compared with others, but on that occasion, the cause was attributed to the fact that the curriculum in force did not contemplate the radiology subject as being mandatory[17]. Given that in this case averages are still relatively low, assessing for possible causes is essential.

About the practical phase

The OSCE, as well the theoretical exam, followed the recommended phases for its construction, which also allows for inferences with a high degree of validity to be made. Cronbach's alpha score (0.59) is within the range reported for exams with less than 10 stations (0.56-0.74)[18]. The G-coefficient was used as a complementary strategy to measure internal consistency, with the result being 0.57 in this case, which can be interpreted as being an intermediate level, probably because there were only 5 stations.

With regard to OSCE's overall results, a mean of 62.2 was obtained in our study, similar to a study conducted in the USA in 106 residents just at the completion of the medical degree program, with an 8-station OSCE of 12 minutes each, where a mean of 64.2 was obtained[19], although in our case the population about to start undergraduate medical internship. Another study, carried out in seven undergraduate classes of students at the end of internship in the UNAM Faculty of Medicine Unified Curriculum, reported a mean of 61.4 in summative assessments[20].

Among the clinical competence attributes, diagnostic and laboratory tests, therapeutics and physical examination were documented to have obtained the lowest values. About the reason why laboratory and imaging studies end up with low values, the explanation is the same that was discussed with regard to the theoretical phase; although this area of knowledge has several weeks planned in the curriculum, the real challenge consists in not failing to integrate it in all clinical courses. These results are similar to those reported in other studies and that are explained because laboratory and imaging tests interpretation implies theoretical knowledge, and not only repetition of the activity, and therefore it behaves with a similar retention curve to that of knowledge assessments[21].

As for therapeutics, it is a domain previously documented as being deficient in other settings[22-24]. The most plausible explanation proposed in other studies is that, even in graduate physicians, the students' degree of responsibility is lower than that required to learn such a complex activity, and although at this stage the students have already rotated in hospitals, only exceptionally have they been in charge of prescription. With regard to the low values found for physical examination, this is a finding that has been documented in several countries[25,26]; learning to correctly examine requires for the procedure to be witnessed many times, performing a physical examination under

supervision on several occasions, and receiving opportune feedback, with all these aspects not having sufficiently occurred at this stage of the curriculum. Once again, the proposal for improvement is not increasing clinical hours or establishing remedial measures, but to integrate physical examination to the practice of all subjects that take place in clinical fields[27].

Communication, interrogation and assessment by the patient were the attributes with the highest values. Assessment by the patients has been widely described with regard to the OSCE; evidence has demonstrated that clinical skills are often undervalued[28] and that communication skills have a fair value[29]. Since the evaluation granted by patients in this OSCE is global (it involves communication and received treatment), we assume that they are adequately assessing owing to the received training; they did not assess clinical skills. As for communication, when compared with the results of previous profile, it is the attribute that was the lowest in the previous phase (mean of 41) and the highest at this phase (72.2 ± 20.6). We might then conclude that, between an intermediate profile and another, the verbal communication attribute is broadly developed, since at this phase the students interrogate a significant number of patients in contrast with previous phase, where they practically haven't seen patients. This is a relevant finding, since the importance good communication has for patient health is increasingly growing, as well as the need to strengthen the relationship with them and avoid eventual legal problems[30].

Study limitations

The largest limitation of the study is related to the fact that the proportion of assessed students is barely two thirds of the entire population of this undergraduate class. This occurred because the students could choose not to undergo this assessment, given its formative nature. Since we don't know these students' characteristics, we cannot extract firm conclusions on how our results would have been if they had chosen to be assessed.

The attribution of results is another unavoidable limitation when an entire curriculum is changed; i.e., since comparing with a control group is not possible, we don't know if any alternative curriculum shows different results than this. Another limitation is that, since there is no approval standard, both instruments' global assessments (knowledge exam and OSCE) may lend to subjective interpretations; it is important for an approval standard for both instruments to be determined in future studies.

Another limitation of the OSCE applied this time is that it was comprised only by 5 stations, which necessarily restricts the amount of measured competencies. Since in exams of this type the resolution of one case has not a high predictive value for the resolution of another (case or context specificity), the higher number of stations an OSCE has, it will be better to obtain solid conclusions. In this sense, it can also be favorably argued that 12-minute lasting stations allow for a more comprehensive medical consultation to be observed, with regard to those of shorter duration, which fragments clinical competence.

Study strengths

Both in this profile and the previous one, the assessment results were submitted to the Faculty of Medicine academic departments in a summarized form in order for them to be forwarded to faculty members, and confidentially to the students in individual reports with the results. The importance of feedback has been described as a key principle to effective learning[31] and learning improvement[32], and it can develop student self-regulation as well[33].

Formative assessments can be regarded as leaning tools, since the exercise of evoking previous knowledge changes memory, and that simple fact rebuilds knowledge and is useful, especially for complex knowledge, as the one occurring in science[34]. Furthermore, this type of assessments that integrate re-information in the process provide the student with a tool to identify those areas where his/her skills require to be improved or to reinforce those contents he/she identified as being deficient, which would allow for him/her to overcome the identified deficiencies and improve his/her skills and knowledge[35].

This study clearly shows that educational interventions are required in some areas of the curricula in order to make relevant changes both in teaching and contents.

Since the results obtained in this study with a rigorous methodology have validity evidence, an essential condition for rational and evidence-based decision making, generalizing the use of formative assessments, especially the OSCE, which not necessarily excludes summative assessment, in relevant academic departments of the UNAM Faculty of Medicine is proposed, as one more feedback source for the improvement of medical education quality, and turning them into tools

for continued improvement, not only of the students but of academic programs and 2010 Curriculum, for the benefit and safety of patients.

Conclusions

This study assessed knowledge and clinical skills acquired during the five previous semesters of study, a complex situation that implies not only the students' capacity to recall information, but also knowledge integration and application and solution of health problems. A starting point for competencies' follow-up is established at this education level.

The overall results provide evidence that students sufficiently achieve the knowledge and competencies established in the Curriculum at the completion of the 9th semester, and that they possess the composed basis of system of knowledge, clinical skills, attitudes and interconnected ideas that has allowed for them to develop clinical competence to such a degree that suggests that most of them will continue learning new and more complex information and integrating it with existing ideas, in order to achieve significant learning and continue their training in the undergraduate medical internship.

The importance and meaning of formative assessments determine the relevance of broadening and deepening this type of studies, the results of which may feedback medical teaching and strengthen the primary purpose of such exams.

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