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AN ANALYSIS OF THE WAY OF EXAMINING THE KNOWLEDGE OF MEDICAL STUDENTS

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Abstract

The examination of medical students involves an extreme responsibility, especially in clinical disciplines where the examination is done in successive steps, the progress of which is conditioned by the admission in the previous one, and in which the examination is done in different ways depending on the particularities of the discipline. As each theoretical and practical activity is completed, an evaluation of the level of acquisition of theoretical knowledge and practical skills of the medical students is required, considering the fact that the medical activity has an important applied value. A group of students from the University of Medicine and Pharmacy "Grigore T Popa" from Iași, evaluated from the particular perspectives several aspects of the current assessment of theoretical and practical knowledge, comparing dynamic examination during the semester with multiple choice questions (MCQ), very short answer questions (VSAQ) and a practical examination by clinical cases. The analysis involved multiple factors and the results were evaluated including proposals and considerations for optimization in relation to the current world trends in evaluating medical students but also in relation to local particularities.

Key words: medical student evaluation, very short answer questions, multiple choice questions

Introduction

The assessment of theoretical and practical knowledge of medical students is extremely important, but its practical application is not uniform in various medical education institutions around the world. Over time, evaluation methods have undergone changes related to the evolution of education methods but also to the evolution of medicine itself, currently highly technological and under the impact of the implementation of artificial intelligence, an impact still insufficiently evaluated. It is unanimously recognized that medicine can no longer be practiced only with a stethoscope due to the explosive evolution of medical technology. But this technology, including artificial intelligence, will have to be used by doctors, doctors trained or still in training in medical educational institutions. That is why it is necessary to quickly and continuously adapt, step by step, both the manner of teaching, which is also subject to technology, and that of evaluating medical knowledge within these medical universities. From an ethical point of view, the student evaluation performed in each institution should be applied using the same criteria for all series of students, independent of the lecturer, to avoid disparities in student ranking. We are currently assisting the need to complete medical knowledge with technical knowledge in order to facilitate the doctor's access to current technology, to use its possibilities to the maximum, to recognize its limits, but above all to intervene actively in case of their inoperability.

The premise of the performed analysis is related to the extremely different opinions regarding the ways of examining the theoretical and practical knowledge of students at the faculty of medicine, opinions issued by both students and teaching staff. The purpose of the

analysis lies in the identification of ways to optimize current students' evaluations without losing their essence but at the same time updating them to the current evolution of technologically mediated human communication interfaces.

Methods

The students were included on voluntary basis and enrollment was open for medical students from 1st to 5th year of study, in order to cover different views both from the preclinical and the clinical years. Moreover, the included students covered several cultural backgrounds, belonging to several nationalities (both from Europe and Middle East). The evaluation of students' views on the current evaluation process in our university was carried out using a 8-items questionnaire (Supplementary File 1). Each stage of the examination was tackled in the questionnaire and analyzed by the study participants. Most of the answers to the questions were shaped using a 5-point Lickert scale and the students' anonymous answers were reviewed by the teaching staff involved. We set up a small working group with teaching staff from the Faculty of Medicine of the "Grigore T Popa" University of Medicine and Pharmacy, Iași, Romania. The analysis of the questionnaire results was carried out by experienced teaching staff from the faculty of medicine, also selected on a voluntary basis, teaching staff with didactic norms in two pivotal clinical disciplines, taught in the third and fifth year: medical semiology and gastroenterology respectively (module within internal medicine).

The questionnaire was addressed to the current method of examination of theoretical and practical knowledge approved by the "Grigore T Popa" University of Medicine and Pharmacy in Iași, Romania, under the name "Working procedure regarding the conduct of the examination of students starting from the academic year 2022-2023" , which represents the methodology on the basis of which the exams in all disciplines are still conducted (https://www.umfiasi.ro/ro).

The first condition for a student to be accepted for the examination is attendance at courses and practical activities (which in clinical disciplines are synonymous with clinical activities) in the amount of at least 70% of the internship hours or practical works of the discipline.

The second condition is that at one or more colloquiums (depending on the size of the respective discipline) passed during the year, semester or module, the colloquiums that evaluate the students' annual activity, they obtain at least an average grade 5. These colloquiums cover the school subjects taught until the time of examination. It should be noted that this average grade represents 20% of the value of the final grade.

The third condition is that in the practical or clinical test the student is assessed as admitted (not graded with a specific grade).

The fourth condition is that the theoretical test given in the mode of MCQ in electronic manner has a minimum grade of 5. The grade of this test represents 80% of the final grade.

Each of these stages is strictly conditional on the successful completion of the previous one; otherwise, the student is not able to pass that exam.

Results and discussion

144 students were invited to participate in this research; 92 students volunteered to participate from the Faculty of Medicine, Grigore T Popa University of Medicine and Pharmacy, Iași, ranging from the 1st to 5th year of study. Most of the included students were female (54 students, 58,69%), mainly residing in urban areas (64 students, 69,56%). The majority of students were of Romanian nationality (70 students, 76,08%), while 8 students (8,69%) were originating in the Middle East (Israel and Syria) and 14 students from other

European countries (Greece, Republic of Moldova, Germany, France, Albania). The completion rate of the questionnaire was 100% for 89 students (96,73%), while for 3 students the completion rate was 80%.

Based on the questionnaire's results and analyzing each of the criteria applicable to the current examinations, the faculty covered in their evaluation the perspective on objectivity and uniformity of examination, proximity to practical activity, the need to preserve logical thinking, remote practicability in exceptional cases and the facility of responding to appeals.

We recorded a series of factual elements starting from the current manner to perspectives of optimization in the examination.

The first condition of admission to the exam to have a minimum of 70% attendance of the hours of practical activity was easily accepted by students. In the opinion of the teaching staff, a higher percentage of compulsory attendance at the practical activities would have been desirable; this fact was motivated by the difficulty of recovering some practical elements in the conditions of the significant reduction over time in the amount of practical hours in pivotal clinical disciplines (for example the number of hours in medical semiology, an essential discipline in the clinical management of the patient has decreased in the last 30 years from 24 hours/week to 6 hours/week), which gives legitimacy to the teachers' opinion. However, they consider that 70% present hours of practical activity is at the lower limit of the acceptability of access to the exam. From the perspective of the students, it would be desirable to optimize the congruence of the teaching staff's clinical program with the actual teaching program for easier access to the patient and reduction of downtime. The recent reduction in the number of students per group has been extremely beneficial in this respect by facilitating optimal access to the patient bed compared to groups with large numbers of students.

However, for the theoretical activity (courses) this percentage is regarded with reluctance and rather rejected by the students; the motivation lies in the overloading of the program with the limitation of the number of hours intended for individual study, but above all in the profoundly unequal quality of the courses, perhaps not so much from the perspective of information as of the manner of delivery. From the teachers' perspective, the theoretical component taught in the courses is essential to the practical applicability of the information.

Two elements were noticed by the students and generally agreed by the teaching staff: the inequality of the degree of depth of medical information (the opinion was that many teaching staff provide information far above the student level) and the manner of delivery qualified often as boring, unexciting, arid or too voluminous, which indirectly generates a decrease in interest in the respective discipline. Towards solving these issues, adapting the subject to the level of the teaching medical year and constantly reminding the fact that a teacher does *not* have to present everything he/she knows to the student is an element of real optimization of the courses. The method of delivery depends primarily on the communication skills of the teaching staff, not all teaching staff have native skills to disseminate information and cooperate with students; sometimes additional training is required in this regard. An essential step is taking into account students' feedback, which is both formally evaluated by university and informally available for each lecturer to assess for their students. In the end, it is perhaps more important than the strict content of the taught subject that the student develops interest and pleasure in that subject, real engines of evolution and generators of constructive effort. Beyond these considerations related to the content taught, the relationship with the students is very important, a relationship that must be a *normal* teacher-student relationship; paternalistic excesses induce repulsion for the taught subject (as a reflection from the person of the teaching staff), but neither are the excesses launched in the spirit of

political correctness to create a friendship between the teaching staff and the student, which could generate relational imbalances. However, related to the general social context in which students grow up, deeply affected by these slogans, for students, this is for now at the level of an element of reflection. The emergence and widespread of digital media facilitated course presentations in electronic format shifted the focus from the subject and the presenter (whose charisma carries significant educational weight) to the isolated *image* of the presentation (which dries up communication). That is why it would be worth trying to deliver the courses through no digital support free presentations, something accepted by few teaching staff, but which would certainly have a maximum long-lasting effect.

The second condition for passing an exam is to have a minimum grade of 5 in the colloquia. These colloquiums are conducted differently from one subject to another but in general they are multiple choice questions, very short answer questions and/or clinical cases. Analyzing the elements of these types of examinations in detail, we can say that the version of questions with very short answers meets most of the analyzed criteria. In addition, they are accepted as superior to MCQs in most institutions of higher medical education (Sam et al., 2019a).

Objectivity and uniformity. Very short answer questions (VSAQ) delivered in the form of blitz tests (the same topic for an entire series) fully meets this criterion. In the version of the oral evaluation (verbal questions), it is obvious that they will no longer be identical for all students, but a teacher can balance the level of the questions in order to assess the level of preparation of the students as objectively as possible. Moreover, the teaching staff can and must adapt and modulate the questions in sequence according to the level of training ascertained from the answers to the previous questions (Sam et al., 2018).

Proximity or relevance to clinical activity. This criterion will be respected if the questions concern only those elements anchored in what a doctor will have to do practically; obviously, the theoretical part will also need to be known to support the practical part, but it is not the subject of this evaluation segment (Sam et al., 2019b).

Preserving logical thinking is essential for a future doctor; this element is maximally assessed by VSAQ cascade type of clinical cases (uniform assessment) but also by direct clinical cases (but this assessment will be the subject of the practical exam).

Remote practicability is another criterion met by VSAQ because in special situations, such as the pandemic period, it is applicable online.

The ease and objectivity of responses to appeals is met in the VSAQ version only if a scale is made available to the students after the delivery of the test, which is desirable. This provision of a scale significantly limits the number of appeals by providing a faster self-feedback to the student who will be able to further focus on improving the sensitive points in his medical education.

The third condition for passing the exam is passing the practical exam, which in the clinical disciplines consists of a clinical case (in some disciplines with a supplement of electrocardiographic images, imaging etc). This practical test, the essence of medical training (Wass et al., 2001), is today in derision, being marked with accepted/rejected in the conditions where there is no minimum scale (at which the all-or-nothing law works) and in the conditions where it is practically equalized between the student who knows 10 and the 5, both passed, but extremely unequal in terms of knowledge and skills.

The criteria of *objectivity and uniformity* are more difficult to meet as the students will obviously have different patients as clinical cases, some cases being easier, others more difficult; but this is where the skills of the teaching staff to select the cases offered for examination as well as the level of depth of approach to difficult cases come into game. The time allocated to this component of the exam will be significantly longer, as each student is

listened individually, but this is the most relevant part of examining a student's level of medical knowledge.

The *applicability to the clinical activity* is maximal for this practical exam and it most correctly reflects the student's possibilities of interrelationship with the patient.

The *preservation of logical thinking* can be extremely well appreciated because the practical exam appreciates complex and dynamic: the ability and correctness of taking an anamnesis, the manner of communication with the patient, the ability to make a complete and correct objective clinical examination, the ability to notice the degree of emergency, adaptability to the case, developing a diagnostic assumption, developing an investigation and treatment plan, capturing the particularities of the case, performing differential diagnoses, establishing a patient surveillance plan etc.

But from the perspective of *remote practicability* this type of exam does not meet this criterion. It can be substituted in extremis with a surrogate of clinical cases or in cascade or written essays, with open questions to be developed in detail, but the evaluation by this method on the account of a practical test is at least modest and lacking in accuracy (Hift, 2014).

Objections to the evaluating scores by practical exam are difficult to manage, especially if the exam plan, punctual requirements, expectations are not presented to the student in advance. The ready reckoners are inoperable in clinical cases.

The fourth criterion for passing an exam is obtaining a grade of at least 5 in the theoretical test. This is currently done through MCQ tests from the theoretical lessons taught in the course and found in the bibliography available to students at the beginning of the year, semester or module, as the case may be.

The criteria of *objectivity and uniformity* are fully met in this type of exam because all students will receive exactly the same MCQ type questions (Burton *, 2005). But as the questions are made by teachers limited by the bibliography of the respective subject, sometimes they are either extremely difficult or without a significant degree of relevance (McCoubrie, 2004; Tarrant et al., 2009). Optimizing this aspect can be achieved by assigning this task to teachers with long-teaching experience and not dividing this task equally among all teachers; in addition, they need to be cross-checked by the same category of teaching staff. Obviously this can create inequities if not otherwise compensated.

The criterion of *proximity to practical activity* is inoperative because this segment evaluates theoretical knowledge; but obviously the level or degree of depth of this theoretical knowledge must be subordinated to the major purpose and practical objective of a medical school, to raise doctors rather than established researchers (who are anyway in the minority and will be selected based on native abilities or natural inclinations, from among medical students).

If we refer to this goal of a medical faculty, perhaps it would be worth considering the possibility of changing the chronology of these tests because in a logical way, to apply something practical you must first have theoretical knowledge, or from this perspective, it would be logical to give first a theoretical test and then a practical one (which assumes the theoretical knowledge evaluated previously but also something more). Moreover, the weight of this test in the final grade and the way it is carried out in the form of MCQs unbalances the way students learn, who will obviously learn more in the theoretical part and in the practical part they will learn (logically!) only for grade 5, a grade that ensures them the accepted qualification for next step. In long-term, medical schools will have students who are highly skilled at managing MCQs but less able to manage the patient relationship (the ultimate goal of medical education!).

Preservation of logical thinking is not a criterion met by the MCQ examination because these tests require primarily good memory and secondarily, sometimes minimally, logical thinking.

Remote practicability is a criterion met by the MCQ variant because it can be applied in extreme situations in the online variant. Obviously, in this variant, the difficulty falls on the factors responsible for the security of information transmission.

But the method is extremely easy for appeals because there is a bibliography with clear texts, theoretically there should not be any more appeals.

This strictly conceptual approach carried out by our small group deserves to be expanded by studies carried out by researchers in the field of medical education on groups of students (students who are an essential part of the activity sphere of medical faculties) and on groups of teaching staff at medical faculties, for a quantitative or semi-quantitative evaluation of the aspects reported by us, to confirm (or deny) our findings or assumptions but especially to detail them in a world where research activity has standardized rigors and medical didactic activity as well as medicine currently works, at evidence-based level. Moreover, the considerations are worth studying as applicability at doctoral levels as well.

Conclusions

The current method of examining the theoretical and practical knowledge of medical students is a complex one, with successive steps, the completion of each is conditional on admission to the previous one. The final mark is a weighted mix of the colloquial and theoretical tests and the practical test is evaluated only with qualifications (but with the result essentially accepted as a stage of access to the MCQ theoretical test). The method is in continuous optimization (Puthiaparampil et al., 2019), aiming to cover ethical issues on equity and responsibility both from students' and tutors' perspective. In recent years significant efforts and investments in the digital infrastructure have been made in our university to support the optimization of students' examinations. But, like any examination method, the current status requires permanent adaptation, not only to cover the need for objectivity of the examination, but also to a multitude of factors that the examiner must take into account. Among these factors, one landmark is the extreme digitization not only of medical and educational activities, but also of life in generally, which has positive but also negative aspects (data security, cognitive and emotional modeling, ideational poverty, emergence of digital diseases, relational anomalies, distortions of perception), all currently under evaluation. Another key factor to be considered is retaining the ultimate purpose to the medical educational approach, which is shaping clinical practitioners, keeping the human element and including the student's satisfaction related to the personal feeling of evolution and not to the final grade obtained, likely to open the way to the satisfaction of curiosities, the engine of progress of any kind.

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