Original Article

Ways to Improve Scores in Objective-Base Long Case Examination For 6th-Year Medical Students in the Internal Medicine Rotation

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Objective: To evaluate strengths and weaknesses of 6th year medical students in the long case examination.

Materials and Methods: The authors retrospectively reviewed a checklist of all 6th year medical students who undewent the long case examination during the internal medicine rotation in 2013. The numbers of students who received "improvement required" matrix in each domain were tabulated with the category status by the total score. This association was calculated among groups and between those who were in the "passed" vs the "good" category.

Results: In 2013, 227 medical students completed the examination. The average score of all of the students was 75.4 (S.D. 10.6). There were 11 students (4.8%) who failed the long-case examination. The top three domains with "improvement required" matrices were clinical reasoning (40 students or 28.0%), decision making (39 students or 27.3%), and physical examination (27 students or 18.9%). Four domains differed significantly in the "passed" and "good" categories: history taking, physical examination, data gathering, and clinical reasoning.

Conclusion: To improve scores, student should work to improve in the following four clinical domains: history taking, physical examination, data gathering, and clinical reasoning.

Keywords: assessment; medical students; internal medicine; clinical reasoning

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Long case examination is a tranditional assessment method for clinical clerkship[1]. The advantage of the long case examination is that students will encounter real patients and real situations[1-3]. There are several limitations, however, including reliability, feasibility, validity, examiner bias, and case-specific issues[1-3]. There are several modifications[1,4-6] that can be used to improve the quality of long case examinations including direct observation, increasing the numbers of cases, and objective structured long examination record [OSLERs]. One study showed that the sequential OSLER examination had better reliability than the objective structured clinical examination [OSCE][7]. The reliability was higher (0.77 for 8 encounters vs. 0.55 for 12 OSCEs). Additionally, the OSLER saved at least 30,000 GBP 30,000 compared with the OSCE.

A long case examination has been part of the Thai Center for Medical Competency Assessment and Accreditation [TCMCAA]'s national license examination. The examination is taken by medical students in their sixth or final year. Department of Medicine in Khon Kaen University's Faculty of Medicine has offered this at the end of internal medicine rotation in order to comply with the TCMCAA regulation. The format consists of direct observation and objective-based assessment.

There are seven domains to be assessed during the case examination including history taking, physical examination, data organization/presentation, clinical reasoning, decision making, communication

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skills, and professionalism. Several studies have shown that the OSLER examination is an effective assessment method with a high agreement of 89% between examiners and good reliability[6,7]. There is limited data on how well the students performed during the long case examination in each of the seven domains. This study aimed to evaluate strengths and weaknesses of students in the long case examination. The results of this study may be helpful in improving medical students' clinical skills and later on their future practices.

Materials and Methods

The authors retrospectively reviewed a checklist of all 6th year medical students who underwent the long case examination during the internal medicine rotation in 2013. The checklist was produced by the TCMCAA. The results of this examination were used as a part of the third step in the national license examination. The test was performed during the last week of the 12-week rotation in internal medicine. This long case examination was also a part of a summative evaluation of the internal medicine rotation. Other examinations included a short essay and OSCE examination which consisted of two parts: a short case OSCE examination and a laboratory OSCE examination.

Cases used in the examination fell into category 1, the "must know" category. The patients with simple diagnosis categorized as "must know" according to Thai Medical Competency Assessment Criteria for National License were selected. Students were informed that they had 60 minutes to complete the test under direct observation by one examiner; 30 minutes for history taking and physical examination, 5 minutes for preparation, and 25 minutes for presentation and discussion. Feedback was performed immediately after the exam and had no effect on the test score. One student was randomly assigned to one patient and one evaluator. Both students and evaluators were informed regarding the score sheet, passing level, and time frame of the tests.

The checklist consisted of the seven domain mentioned above. Each domain was worth 15 points, with the exception of the data oragization/presention domain, which was worth 10 points. In each domain had three matrices to assess students' ability: very good, good, or improvement required. The scorings for these three matrices were 15/10, 10/6, and 5/4, with the first number being for the 15 point domains, and the second being for for the 10 point domain. By way of example, in the physical examination domain, a student would receive a "very good" score if he/she had followed the correct steps and techniques of physical examination, had an appropriate examination time, and had correct findings. A "good" score was similar to the "very good" score, except the results of phycial were acceptably correct. The "improvement required" score meant that steps and technique for physical examination were incorrect, not systematic, and time-consuming or the physical findings were mostly incorrect. The total score was 100 with passing level of 60. The passing level was set by the TCMCAA.

Each student's total score was used to categorize students as "failed", "passed", "good" or "excellent". The cutoff points for each category were less than 60, 60 to 69, 70 to 79, and more than 80, respectively. The numbers of students who received "improvement required" matrix in each domain were tabulated with the category status by the total score. This association was calculated among groups and between those who were in the "passed" vs. the "good" category. The associations were executed by using a two-sided, Fisher exact test. The significant *p*-value was defined as less than 0.05.

Results

In 2013, 227 medical students completed the examination. The average score of all of the students was 75.4 (SD = 10.6). There were 11 students (4.8%) who failed the long-case examination. The majority of students were in the excellent category (99 students or 43.6%), while the passed and good category had 58 (25.6%) and 59 (26.0%) students, respectively.

The top three domains with "improvement required" matrices were clinical reasoning (40 students or 28.0%), decision making (39 students or 27.3%), and physical examination (27 students or 18.9%) as shown in Table 1. All domains were differed significantly among the four groups of students (Table 2).

Four domains differed significantly in the "passed" and "good" categories: history taking, physical examination, data gathering, and clinical reasoning (Table 3).

Discussion

The failure rate of the objective-based long case examination in internal medicine was low (4.8%). Almost half of the students were in the "excellent" category (43.6%). Clinical reasoning and decision making were the two highest domains in which medical students received the "improvement required" matrix (40 and 39 students, respectively) as shown in Table 1. These two domains were highly correlated with each

Table 1. Numbers of the 6th-year medical students in each matrix of the seven long case examination domains

Domains/matrixes	Very good	Good	Improvement required	Total
History taking	132	90	5	227
Physical examination	50	150	27	227
Data gathering	61	146	20	227
Clinical reasoning	44	143	40	227
Decision making	25	163	39	227
Communication	90	128	9	227
Professionalism	168	56	3	227
Total	570	876	143	1,589

Table 2. Numbers (%) of the 6th-year medical students who received an "improvement required" matrix in each domain of the long case examination categorized by total score

Domains/groups	Failed n = 11	Passed n = 58	Good n = 59	Excellent n = 99	*p*-value
History taking	1 (9.1)	4 (6.9)	0	0	0.008
Physical examination	7 (63.6)	16 (27.6)	4 (6.8)	0	<0.001
Data gathering	6 (54.5)	11 (19.0)	3 (5.1)	0	<0.001
Clinical reasoning	8 (72.7)	21 (36.2)	9 (15.3)	2 (2.0)	<0.001
Decision making	6 (54.5)	15 (25.9)	14 (23.7)	4 (4.0)	<0.001
Communication	2 (18.2)	3 (5.2)	3 (5.1)	1 (1.0)	0.010
Professionalism	1 (9.1)	2 (3.4)	0	0	0.020

Table 3. Comparison of the 6th-year medical students in the"passed" and "good" categories who received an "improvement required" matrix by domain

Domains/groups	Passed n = 58	Good n = 59	*p*-value
History taking	4 (6.9)	0	0.004
Physical examination	16 (27.6)	4 (6.8)	0.003
Data gathering	11 (19.0)	3 (5.1)	0.021
Clinical reasoning	21 (36.2)	9 (15.3)	0.009
Decision making	15 (25.9)	14 (23.7)	0.789
Communication	3 (5.2)	3 (5.1)	0.983
Professionalism	2 (3.4)	0	0.154

other. Clinical reasoning that was not appropriate for diagnosis and differential diagnosis led to incorrect decision making regarding either laboratory investigation or treatment.

Not surprisingly, all domains differed significantly among categories of the students (Table 2). These data indicated that objective-based long case examination has the ability to categorize students as passed/failed. However, some limitations existed, as mentioned above, particularly case specificity, the fact that it was based on a single encounter, and examiner bias. We compared the numbers of students who were rated as "improvement required" in the "passed" and "good" categories (Table 3). In order to get higher scores, students should be more knowledgeable about history taking, physical examination, data gathering, and clinical reasoning. The decision-making domain was not significant in this comparison (Table 3), unlike in the overall assessment (Table 1). Subjects in both the "passed" and "good" categories gave correct diagnoses resulting in correct management. In other words, case management was not a problem if the

diagnosis was correct.

If students in the "passed" category would like to raise their scores, they should primarily focus on improvement in the following four clinical domains: history taking, physical examination, data gathering, and clinical reasoning, all of which are linked. Only one out of the 277 students (0.3%) who failed was rated as "improvement reqired" in history taking as shown in Table 2. It is surprising that one-fourth of students in the "passed" category failed in the physical examination domain. This was reflected their performance in this domain as was directly observed by the examiner during their physical examinations. This means that one could expect to find errors in physical examination, such as incorrect technique, failure to follow the necessary steps of the examination, or inability to detect abnormal physical findings. Measures should be considered to remedy this problem such as physical examination workshops or a qualified evaluation at the end of students' fifth year focusing on physical examination. As previously reported, clinical reasoning was the weakest clinical skill during the OSCE examination[8]. The mean score of clinical reasoning was the lowest of all of the domains at 5.89, while the procedural skill had the mean score of 6.59.

The SNAPPS technique may be a useful method to improve clinical reasoning and case presentation in both outpatient and inpatient settings[9-12]. SNAPPS is an acronym that stands for "Summarize history and findings, Narrow the differential, Analyze the differential, Probe preceptor about uncertainties, Plan management, and Select case-related issues for self-study"[10]. In a randomized controlled trial at the Family Medicine Department, SNAPPS assisted medical students in their clinical reasoning ability 84.38% compared with 10.77% using the conventional presentation technique.

There are some limitations in the present study. First, professionalism was a domain that was difficult to evaluate during the long case examination and required special evaluation techniques such as a 360 degree evaluation. Second, the results of this study were based on the assumption that there were no biases or differences among examiners. However, there are some methods implemented to reduce evaluator bias. Both students and evaluators were randomly assigned to avoid previous student-teacher relationships. There was also pre-examination orientation at which the evaluators were informed regarding bias. Finally, this study was limited in that it was based on a single encounter instead of being sequential.

Conclusion

The 6th year medical students performed well on objective-based long case examination in the internal medicine rotation. The failure rate was low at 4.8%. To improve scores, student should work to improve in the following four clinical domains: history taking, physical examination, data gathering, and clinical reasoning.

What is already known on this topic?

There is limited data on factors associated with passing long case examinations for Thai national examination for medical students.

What this study adds?

Medical students should prepare in history taking, physical examination, data gathering, and clinical reasoning to have better long case examination scores for Thai medical license examination.

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Potential conflicts of interest

The authors declare no conflict of interest.

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