Original Article

The Relationship Between Self-Assessment Ability and Performance in Medical Graduates: A Correlation Study

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Objective: Self-assessment ability is critical for health professionals. This study aims to understand the relationship between self-assessment ability of junior physicians and their performance.

Methods: The study enrolled 73 medical graduates in the entrance examination to a PGY (Post Graduate Year) program. The examination comprised a 50-question MCQ (Multiple Choice Question) test and an MMI (Multiple Mini Interview). At the end of MCQ test, subjects were given a self-assessment questionnaire to evaluate their awareness of the accuracy of answers. Self-assessment ability was evaluated based on two components: "the accuracy of correctly identifying the right answer" and "the accuracy of correctly identifying the wrong answer". The relationship between self-assessment ability and the MCQ score, MMI score and university GPA score were analyzed.

Results: The degree of accuracy was 0.78 to 1.00 for "correctly identifying the right answer" and 0 to 0.93 for "correctly identifying the wrong answer". The two components were neither significantly correlated with the MCQ score (r = 0.150 and 0.077; p = 0.207 and 0.515) nor the GPA score (r = 0.152 and 0.076; p = 0.200 and 0.521). A negative correlation without significance was observed between self-assessment ability and the MMI score (r = -0.068 and -0.013; p = 0.566 and 0.912). The two components of self-assessment ability demonstrated a negative correlation with significance (r = -0.529, p < 0.01).

Conclusion: Self-assessment ability in junior physicians is limited and does not make an appropriate predictor for the performance. A reflection on self-assessment and its role in the practice and learning of medical professionals is needed.

Key words: self-assessment ability, performance, physicians, residency

Introduction

It is widely acknowledged that self-assessment ability is a vital skill for health professionals, who are generally believed to demonstrate self-regulation. The capacity to recognize personal strengths and weaknesses aids the pursuit of lifelong learning and improvement in practice, and hence helps maintain or increase professional competence.¹⁻⁵

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The ability to recognize one's weaknesses enables health professionals to know their limits in the practice and helps them know when to request a consultation. On the other hand, the ability to identify one's strengths enables health professionals to hold steady without hesitation when facing up with a condition, in which initial management does not take effect. Furthermore, self-assessment ability also aids health workers in establishing appropriate learning goals. However, despite studies published in the past decades, it is a ubiquitous finding that self-assessment is in fact poor.⁶ Although Ward and colleagues disputed that there might exist methodological flaws in the literature⁷; studies in the following years which amended those flaws still failed to produce evidence for effective self-assessment.⁸

This study aims to understand if junior physicians, who have recently graduated and prepared to enter the stage of residency, can effectively perform self-assessment. Moreover, the relationship between self-assessment ability and performance of medical graduates is also an issue of interest. The research aims to know whether self-assessment ability of physicians can help predict their performance.

Materials and Methods

In 2011, 73 medical graduates who participated in the entrance examination to the PGY (Post Graduate Year) residency program in a teaching hospital in southern Taiwan, were enrolled in the study. The subjects were composed of 27 males and 46 females, with the age ranging from 25 to 36 years. The examination comprised a written test of MCQ (Multiple Choice Question) on clinical knowledge and an MMI (Multiple Mini Interview). There were two sets of 50-question MCQ. The examinees were given 30 minutes on each paper. At the end of each MCQ test, a selfassessment questionnaire was distributed to the subjects to evaluate their awareness of the accuracy of answers. The examinees were given 15 minutes on each questionnaire. The results of the questionnaires were analyzed.

In Table 1 (shown below), "A" represented the number of questions which the subjects considered they answered correctly and in fact they did, while "B" stood for the number of questions which the subjects considered they answered wrongly and in fact they did.

On the other hand, "C" represented the number of questions which the subjects considered they answered wrongly but in fact they got them right, while "D" stood for the number of questions which the subjects considered they answered correctly but in fact they got them wrong.

Self-assessment ability was evaluated by two components: "the accuracy of correctly identifying the right answer" and "the accuracy of correctly identifying the wrong answer". The former was defined as A/A+C, while the latter as B/B+D (Table 1).

The MMI comprised 3 stations. Each station emphasized on one of the topics: personal background and motivation of pursuing a medical career, expectations of the training, and understanding of the residency program and the hospital. The attitude, thinking process and communication skills of the examinees were assessed in the interviews.

Based on the academic GPA percentile, each subject was categorized into one of the four groups: 1 - 20%, 20 - 50%, 50 - 80%, and 80 - 100%. Different scores of 50, 40, 30, and 10 were given accordingly (A).

Table 1. The degree of accuracy in the self-assessment questionnaire.

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Number of questions reflected in the self-	Number of questions answered in the MCQ test						
assessment test	Correctly answered	Wrongly answered					
Reflected as Correct	А	D					
Reflected as Wrong	С	В					

Chen et al. / E-Da Medical Journal 2020;7(1):22-28

		Total number of				
_	\geq 90	80 - 90	70 - 80	60 - 70	< 60	 subjects
MCQ test	0	9	40	21	3	73
MMI	0	5	45	22	1	73
GPA	0	2	6	18	47	73

Table 2. The distribution of the scores of subjects in the MCQ test, MMI and GPA.

Note: Score 80-90 includes the point of 80 and the same rule applies to other groups.

The university from which the subjects graduated was also taken into account. Each subject was categorized again into one of the three groups: the ones graduating from the top three medical colleges, the ones from schools other than the top three, and the ones from schools of Chinese medicine or post-bachelor medical programs. An exponent of 2, 1.5, or 1 (B), was applied to each subject based on the school. The GPA score was obtained by multiplying A and B.

The relationship between self-assessment ability and the MCQ score, MMI score and GPA score were analyzed by applying Pearson correlation.

Results

In the MCQ test, the number of subjects achieving the score of above 90, 80-90, 70-80, 60 - 70 and below 60 was 0, 9, 40, 21 and 3, respectively. In the MMI section, the number

was 0, 5, 45, 22 and 1, respectively. When it came to the GPA score, the number was 0, 2, 6, 18 and 47, respectively (Table 2). The highest and lowest score in the MCQ test, MMI and GPA were 84/56, 86.71/59.93, and 80/10, respectively.

In the study, the results of self-assessment ability were as following. The degree of accuracy for "correctly identifying the right answer" ranged from 0.78 to 1.00, while that for "correctly identifying the wrong answer" ranged from 0 to 0.93.

The Pearson correlation was applied to analyze the relationship between self-assessment ability and the scores of MCQ, MMI and GPA, with p value obtained.

The results revealed neither the degree of accuracy for "correctly identifying the right answer" nor that for "correctly identifying the wrong answer" was well correlated with the MCQ score (r = 0.150 and 0.077). The *p* value did not demonstrate a statistical significance



Fig. 1 The correlation between the degree of accuracy of "correctly identifying the right answer" and the MCQ test score. The accuracy is not well correlated with the MCQ score.



Fig. 2 The correlation between the degree of accuracy of "correctly identifying the wrong answer" and the MCQ test score. The accuracy is not well correlated with the MCQ score.

		MCQ score	GPA score	MMI score	of "correctly identifying the right answer"	Degree of Accuracy of "correctly identifying the wrong answer"
MCQ score	Pearson correlation coefficient	1	.378	.043	.150	.077
	Two tailed probability		.001	.717	.207	.515
	Number	73	73	73	73	73
GPA score	Pearson correlation coefficient	.378	1	.045	.152	.076
	Two tailed probability	.001		.704	.200	.521
	Number	73	73	73	73	73
MMI score	Pearson correlation coefficient	.043	.045	1	068	013
	Two tailed probability	.717	.704		.566	.912
	Number	73	73	73	73	73
Degree of Accuracy of "correctly identifying the right answer"	Pearson correlation coefficient	.150	.152	068	1	529
	Two tailed probability	.207	.200	.566		.000
	Number	73	73	73	73	73
Degree of Accuracy of "correctly identifying the wrong answer"	Pearson correlation coefficient	.077	.076	013	529	1
	Two tailed probability	.515	.521	.912	.000	
	Number	73	73	73	73	73

Table 3. The results of Pearson correlation analysis.

(p = 0.207 and 0.515)(Table 3)(Fig. 1, 2). The analysis implied there was no strong correlation between self-assessment ability and the MCQ score, and the former was not a suitable predictor for the latter.

A similar result was noted in the relationship between the degree of accuracy and the GPA score. Neither the degree of accuracy for "correctly identifying the right answer" nor that for "correctly identifying the wrong answer" was well correlated with the GPA score (r = 0.152 and 0.076). The *p* value did not demonstrate a statistical significance (p = 0.200 and 0.521)(Table 3)(Fig. 3, 4). The analysis implied there was no strong correlation between selfassessment ability and the GPA score. Whether the subjects could self-assess accurately did not accordingly reflect on their academic performance.

When it came to the relationship between the degree of accuracy and the MMI score, a negative correlation was observed (r = -0.068 and -0.013). The p value did not demonstrate a statistical significance (p = 0.566 and 0.912) (Table 3)(Fig. 5, 6). The analysis suggested when the subjects had a higher accuracy of



Fig. 3 The relationship between the degree of accuracy of "correctly identifying the right answer" and the GPA score. The accuracy is not well correlated with the GPA score.

self-assessment, they would contrarily give a more negative performance in the interviews. It also implied there was no strong correlation between self-assessment ability and the MMI score. Self-assessment ability was not a suitable predictor for the performance of junior physicians in interviews.

One more thing to notice was that the relationship between the two components of self-assessment ability revealed a negative moderate correlation (p = 0.566). The p value demonstrated a statistical significance (p < 0.01)(Table 3)(Fig. 7). The analysis suggested when the subjects had a higher accuracy of



Fig. 5 The relationship between the degree of accuracy of "correctly identifying the right answer" and the MMI score. There is a negative correlation between the accuracy and the MMI score.



Fig. 4 The relationship between the degree of accuracy of "correctly identifying the wrong answer" and the GPA score. The accuracy is not well correlated with the GPA score.

distinguishing the questions they answered correctly, they contrarily showed a lower accuracy of distinguishing the questions they answered wrongly.

Discussion

Studies in several health-related domains consistently demonstrate that self-assessment ability is insufficient in health professionals, including students, junior health workers and experienced clinicians.⁹⁻¹⁴ This study showed that self-assessment ability of the subjects on "correctly identifying the right answer" was fairly



Fig. 6 The relationship between the degree of accuracy of "correctly identifying the wrong answer" and the MMI score. There is a negative correlation between the accuracy and the MMI score.

desirable, while that on "correctly identifying the wrong answer" demonstrated a diverse result.

In addition, self-assessment ability did not have a role in predicting the performance. It implied that the subjects had more certainty on the questions they considered they knew how to answer than those they were unsure of in the first place. This might suggest these junior physicians knew better about their strengths than their weaknesses. However, these two components of self-assessment ability had a significantly negative correlation, which suggested those who possessed a better understanding of their advantages failed to grasp their disadvantages as well.

For a very long time, medicine has been taught mainly through a mentor-apprentice relationship. As medical practice evolves at a rapid rate, innovated teaching methods have been developed.^{15,16} However, it seemed that emphasis has been constantly placed on learning something new instead of reviewing the inadequacy and students still expect and prefer to be assessed by experts rather than themselves or peers.¹⁷ Some studies suggested that the accuracy of self-assessment might improve as the subjects got more familiar with the tasks or



Fig. 7 The relationship between the degree of accuracy of "correctly identifying the right answer" and the degree of accuracy of "correctly identifying the wrong answer". There is a negative correlation between these two types of accuracy.

exam settings.¹⁸ A similar result was observed when the clinical experiences of the subjects gradually built up.¹⁹ Considering the results of this study, perhaps a guidance program to help physicians take a closer look at their weaknesses and enhance self-assessment ability could be considered in the curriculum design of the residency training.

Conclusion

Overall, the accuracy of self-assessment in junior physicians is limited, particularly when it comes to the aspects they did not excel at or unfamiliar with. Meanwhile, selfassessment does not seem to be an appropriate predictor for the performance of physicians. Thus, a reflection on the application of selfassessment and its role in lifelong learning and the practice of medical professionals is warranted.

References

- Arnold L, Willoughby TL, Calkins EV: Selfevaluation in undergraduate medical education: a longitudinal perspective. J Med Educ 1985;60:21-8.
- 2. Gordon MJ: A review of the validity and accuracy of self-assessments in health professions training. Acad Med 1991;66:762-9.
- Boud D: Avoiding the traps: seeking good practice in the use of self assessment and reflection in professional courses. Soc Work Educ 1999;18:121-32.
- Antonelli MA: Accuracy of second-year medical students' self-assessment of clinical skills. Acad Med 1997;72:S63-5.
- Duffy FD, Holmboe ES: Self-assessment in lifelong learning and improving performance in practice: physician know thyself. JAMA 2006;296:1137-9.
- Eva KW, Regehr G: Self-assessment in the health professions: a reformulation and research agenda. Acad Med 2005;80:S46-54.
- Ward M, Gruppen L, Regehr G: Measuring selfassessment: current state of the art. Adv Health Sci Educ Theory Pract 2002;7:63-80.
- Eva KW, Cunnington JP, Reiter HI, et al: How can I know what I don't know? Poor self-assessment in a well-defined domain. Adv Health Sci Educ Theory Pract 2004;9:211-24.
- 9. Davis DA, Mazmanian PE, Fordis M, et al: Accuracy of physician self-assessment compared

with observed measures of competence: a systematic review. JAMA 2006;297:1094-102.

- Austin Z, Gregory PA: Evaluating the accuracy of pharmacy students' self-assessment skills. Am J Pharm Educ 2007;71:89.
- 11. Baxter P, Norman G: Self-assessment or self deception? A lack of association between nursing students' self-assessment and performance. J Adv Nurs 2011;67: 2406-13.
- 12. Tousignant M, DesMarchais JE: Accuracy of student self-assessment ability compared to their own performance in a problem-based learning medical program: a correlation study. Adv Health Sci Educ Theory Pract 2002:7:19-27.
- 13. Langendyk V: Not knowing that they do not know: self-assessment accuracy of third-year medical students. Med Educ 2006;40:173-9.
- 14. Parker RW, Alford C, Passmore C: Can family

medicine residents predict their performance on the in-training examination? Fam Med 2004;36:705-9.

- 15. Farnsworth WE: Training physicians to be doctorsteachers and healers, problem-solvers and decisionmakers. J Am Osteopath Assoc 1991;91:1005-18.
- Cooke M, Irby DM, Sullivan W, et al: American medical education 100 years after the Flexner report. N Engl J Med 2006;355:1339-44.
- 17. Evans AW, McKenna C, Oliver M: Self-assessment in medical practice. J R Soc Med 2002;95:511-3.
- Fitzgerald JT, White CB, Gruppen LD: A longitudinal study of self-assessment accuracy. Med Educ 2003;37:645-9.
- 19. Moorthy K, Munz Y, Adams S, et al: Selfassessment of performance among surgical trainees during simulated procedures in a simulated operating theater. Am J Surg 2006;192:114-8.