Prediction of Resident Performance Ratings and Board Examination Scores from Medical School Grade Point Average and Interview Scores During Resident Selection

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Objective: To evaluate the association between performance before entering the program and the outcomes of post-graduate medical residency training.

Materials and Methods: The selection process scores of 42 applicants for the internal medicine residency program at Siriraj Hospital in academic year 2011 were extracted. The scores consisted of undergraduate grade point average (GPA) during the clinical training years and interview performance during the application process. Association between scores from the selection process and scores from both multisource feedback during training and board certification examinations were then examined. Multiple regression analysis was performed to identify factors associated with training outcomes.

Results: The mean ± standard deviation (SD) undergraduate GPA during the clinical training years was 85.5±6.8, and mean interview performance score was 88.6±4.1. Undergraduate GPA scores during the clinical years had modest correlation with faculty rating scores (r=0.449, p=0.003), and good correlation with written examination scores (r=0.693, p<0.001). Interview performance scores had modest correlation with faculty rating scores (r=0.515, p<0.001), nurse rating scores (r=0.432, p=0.004), and written examination scores (r=0.468, p=0.002). In multivariate analysis, undergraduate GPA scores and interview performance scores were independently associated with training outcomes.

Conclusion: Interview performance as part of a resident selection process has additive effect to previous academic background for predicting future success in residency training.

Keywords: Resident selection, Interviewing, Professional achievement

The stress associated with the medical residency selection process may be even more intense than the stress associated with medical school admission. Internal medicine residency training is a favorite choice for post-graduate medical education in most countries, including Thailand. As such, the process by which these residents are selected should be fully understood and optimized. Improved understanding of the relationships between and among the factors that are considered for selection may improve the quality and success of internal medicine residents.

Traditional interview (TI) for medical school admissions has been shown to have inadequate reliability and questionable validity from interviewer perception, specific questions asked, and irrelevant confounders[1,2]. Structuring the interview, training interviewers, using "medical judgment vignette"[3], and multiple mini-interview (MMI)[4] have been introduced and implemented to improve the selection of the most qualified applicants. In addition to non-academic attributes evaluated by academic background, personal statements, and letters of recommendation, most residency training programs attempt to assess values and applicant commitment

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via interviewing, which is a conventional tool for evaluating applicants that is also used in other professions. The objective of the present study was to evaluate the association between interview performance before entering the program and the final outcomes of post-graduate medical residency training.

Materials and Methods

The internal medicine residency training program at Siriraj Hospital, with 42 positions, had a selection ratio of 1:1.2 to 1.5. Final evaluation of candidates that reach the final stage of the evaluation process were judged on their academic background (60%) and the results of their interview (40%). The protocol for the present study was approved by the Siriraj Institutional Review Board (SIRB) of the Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand. Written informed consent was obtained from all study participants.

There were two separate groups of interviewers, and each consisted of six faculty members that have an active role in post-graduate training. Academic background, personal and career portfolio, and multisource recommendation of candidates were blinded to the interviewers. A semi-structured interviewing format was developed and distributed to interviewers two weeks prior to interviewing. It focused on characters that are important for being a competent internist and that are suitable to our training program, including motivation to be an internist, perception and potential ability to conform with this training program, self awareness in term of strengths and limitations, continuous professional development, professional manners, and communication skills.

Briefing the interviewer role and rater adjustment was conducted in a 15-minute session before the start of interviewing. Interviewers were asked to avoid questions that are illegal to ask in the US, such as questions relating to sexual preference and family planning[5]. Each candidate had 15 minutes to interact with a panel interviewer. Debriefing and satisfaction survey among interviewers were conducted immediately after the interview. Resident candidates were also asked to perform a satisfaction survey.

Scores from the selection process conducted in academic year 2011 were retrieved. The scores consisted of undergraduate grade point average (GPA) during the clinical training years and interview performance scores.

Multisource feedback during training consisted of a performance rating by faculty and nurse in each rotation during the three years of training. Performance assessment by faculty included the following six dimensions, patient care, medical knowledge and skills, practice-based learning and improvement, interpersonal and communication skills, professionalism, and system-based practice. Performance assessment by nurse included the following four dimensions, patient care, interpersonal and communication skills, professionalism, and system-based practice. Each dimension was rated on a five-point (1 to 5) response category, with a score of 1 indicating below standard, and a 5 reflecting excellent.

The written board certification examination consists of 300 multiple choice questions (MCQ) that relate to internal medicine knowledge.

The clinical board certification examination is an observed long case examination with 2 selected cases, and the Objective Structured Clinical Examination (OSCE) relates to laboratory skills and radiographic interpretation skills.

Association between selection process scores and scores derived from multisource feedback during their training (2011 to 2013) and scores from the written board certification examination (2012) and clinical board certification examination (2013) were then examined using Pearson's or Spearman's rank correlation, as appropriate. An r-value of less than 0.3, 0.3 to 0.5, and 0.5 to 0.7 are considered no, weak, and moderate correlation, respectively, and any value above 0.7 is considered good correlation[6]. A p-value less than 0.05 was considered statistically significant. Multiple regression analysis was performed to identify factors associated with training outcomes. All statistical analyses were performed using SPSS Statistics version 16.0 (SPSS Inc., Chicago, IL, USA).

Results

Of the 58 people that applied to the internal medicine residency program in 2011, 42 candidates (23 female and 19 male) were selected. Mean undergraduate GPA data during the clinical training years, and interview performance scores during the resident selection process are shown in Table 1. From the survey that was given immediately after completion of the selection process, good and very good satisfaction was reported in 28 and 21 applicants, and by seven and four interviewers, respectively. Multisource feedback scores during training and board certification examination scores as a measure of final achievement are also given in Table 1.

Scores for undergraduate GPA during the clinical

Table 1. Mean ± standard deviation of each scoring category presented as percentage

Category	Scores
Selection process	
GPA during clinical years	85.5±6.8
Interviewing performance	88.6±4.1
Training achievement	
Faculty rating	83.9±3.7
Nurse rating	94.4±5.0
Written board certification examination	63.4±5.8
Clinical board certification examination	69.8±4.2

GPA=grade point average

Table 2. Correlation analysis for each scoring category

Comparator	r	p-value
GPA during clinical years		
Faculty rating	0.449	0.003*
Nurse rating	0.123	0.438
Written board certification examination	0.693	<0.001*
Clinical board certification examination	0.409	0.007*
Interview performance		
Faculty rating	0.515	<0.001*
Nurse rating	0.432	0.004*
Written board certification examination	0.468	0.002*
Clinical board certification examination	0.262	0.094

GPA=grade point average

* A $p<0.05$ indicates statistical significance by Pearson's correlation

training years had moderate correlation with written board certification examination scores (Table 2), which is consistent with our previously reported findings[7]. Modest correlation between faculty rating scores and clinical board certification examination scores was also demonstrated. GPA as a previous academic background factor did not correlate well with interpersonal skills as assessed by nurse rating scores. In terms of interview performance scores, weak to modest correlation with other scores was observed, except for clinical board certification examination scores (Table 2).

In multivariate analysis, undergraduate GPA (β±SE 0.88±0.22, p<0.001) and interview performance scores (β±SE 1.46±0.0.35, p<0.001) independently associated with training outcomes, while female was inversely associated with training outcomes (β±SE −4.11±2.74, p=0.14). The adjusted R^2 was 0.57 (F=16.74, p<0.001).

Discussion

Professional identity formation is crucial when a general physician desires to become a specialist. This process requires the acquisition of knowledge, skills, attitudes, values, and attributes. Post-graduate training aims to produce high-quality physicians for future independent practice, and a key goal in the selection is the accurate prediction of their trainability. Unstructured interview, which is characterized by conversation without pre-specified questions and objective scoring criteria, appears to be the most commonly used strategy for selecting medical residents. Academic qualifications alone cannot guarantee the future competence of internists after the completion of training. Non-cognitive attributes, such as personal integrity, interpersonal skills, and conscientiousness, should also be considered. The relationship between academic achievement in medical school and clinical competence in residency training varies according to medical specialty, and the relationship between academic performance and performance in clinical practice may be even more difficult to predict[8].

The present study investigated the predictive validity of performance during interviewing in selection process for future career success of internal medicine residents in a large training center in Thailand. Academic background was a strong predictor of medical knowledge achievement relative to theoretical and practical assessments in written and clinical board certification examinations, respectively, and the rating from faculties as supervisors during the training period. However, it was not correlated well with nurse rating that the authors use as a surrogate of interpersonal skills and professionalism[9]. On the contrary, interview performance could better predict the skill of a physician as a member of a health care team in view of nursing colleagues. As a high-value profession, training programs are accountable for ensuring competent internists in their performance of both clinical roles and duties. From a systematic review, optimum number of multisource feedback from medical colleagues, coworkers, and patients has been shown to be reliable and valid method to assess physician in practice[10].

Because of near equal demand and supply, post-graduate admission in Thailand has far less competition than those in undergraduate medical

education. Applicants are more homogeneous, and for internal medicine, the selection ratio is marginal in each training program although it is higher in our training center. Although the fairness of using interview as a highly influential component of medical school admission has been raised, post-graduate candidates in the present study felt that interviewing allowed them to present their strengths and explain their weaknesses. Interviewers also indicated a high level of satisfaction with the whole process that seems to be free from gender and academic background bias. Gender-specific differences were identified from textual analysis of personal statements for US internal medicine resident positions such as men were more likely to mention about their personal qualities and skill, while woman mentioned the communicative and team-based aspect of doctoring[11]. The semi-structured interview using in our selection process was also a potential measure to reduce variation of candidate-interviewer interaction.

Admission tools like the personal interview may be annoyed by context specificity. Multifacet sample approach like MMI has proved its feasibility and cost-effectiveness in undergraduate medical education[12]. MMI has also been used effectively for providing acceptable reliability in residency candidates assessment across Canada, a popular place with huge number of international applicants. However, in places with low selection ratio as in one US emergency training program, MMI was felt to be less enjoyable than TI for applicants in term of less personal connection[13]. Another potential source of these discrepancy results is an interrater variability. Interviewer subjectivity has been demonstrated to be a major factor for reducing reliability of MMI in general practitioner specialty training selection in Australia[14]. Calibration of interviewer as used in our training program TI, may be temporary as labor-intensive selection process like MMI is inevitable because of the future increasing demand for internists in Thailand, both locally and regionally, from the engagement of ASEAN Economic Community (AEC) at the end of 2015.

Tracking of career achievement as an internist via a revalidation process conducted by the Royal College of Physicians of Thailand (RCPT) commenced in 2016. This initiative provides an opportunity to evaluate the long-term outcome of our training program. It will also reflect the appropriateness of our resident selection process. At present in our institution, the interview is used mainly for information gathering and verification of prerequisite information to select those with an ability to communicate appropriately, to evaluate for good interpersonal skills, and to identify candidates with a low level of conscientiousness, extreme detachment from our pattern of training, or with some other vulnerability that would make them unsuitable for our training program.

Conclusion

Post-graduate medical education in Thailand is becoming a more attractive career choice among medical school graduates. The results of the present study showed that a proper interview can be used to augment academic performance data by helping to reveal strengths and weaknesses that may not be revealed by academic achievement alone. This combined strategy facilitates a more comprehensive approach to assessing medical resident candidates.

What is already known on this topic?

TI for medical school admission has been shown to have inadequate reliability and questionable validity.

What does this study add?

Proper interview process as part of a resident selection process has additive effect to previous academic background for predicting future success in terms of interpersonal skills achievement.

Acknowledgement

Conflicts of interest

The authors declare no conflicts of interest.

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