



Predictors of Undergraduate and Postgraduate Clinical Performance: A Longitudinal Cohort Study

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OBJECTIVE: Though many medical schools applied various admission criteria in the selection process, the evidence of using those criteria is unclear. This study examined the predictive validity of each admission criterion for student competency.

DESIGN, SETTING, AND PARTICIPANTS: We conducted a prospective cohort study of all students who matriculated to Seoul National University School of Medicine from 2002 to 2008. Demographic characteristics, admission criteria scores, and clinical competencies based on grade point average (GPA), objective structured clinical examination score, and internship score were obtained for each student to analyze the predictive validity of admission criteria.

RESULTS: Graduate GPA at the end of 4 years positively correlated with preadmission GPA ($p < 0.0001$) and written test score ($p = 0.012$) but negatively correlated with essay test ($p = 0.049$). Internship score significantly correlated with preadmission GPA and graduate GPA. Regression analysis revealed that the preadmission GPA of the affiliated college and young age at admission could predict GPA, and preadmission GPA and graduate GPA could predict the internship score, which indicates postgraduate clinical performance.

CONCLUSIONS: These findings suggest that preadmission GPA is a reliable predictor of academic achievement during medical school and postgraduate clinical performance. For assessing nonacademic competencies, further research is

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KEY WORDS: admission, student selection, medical education, clinical performance, GPA

COMPETENCIES: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Systems-Based Practice, Professionalism, Interpersonal and Communication Skills

INTRODUCTION

Medical school admission committees are faced with the challenge of admitting the applicants who are most likely to become excellent physicians. Over the years, the high school grade point average (GPA) and entrance exam score (national scholastic aptitude test) have been the primary tools used to select medical students. After starting college of medicine admissions for college graduates in 2003 in Korea, selecting applicants among college graduates has been a concern for many medical schools in Korea.

Although the objectives of many medical school curricula emphasize interpersonal skills and personal characteristics, most medical school admission systems mainly assess academic and cognitive abilities.^{1,2} Existing admission processes primarily use the scholastic rank of a student regardless of other potential characteristics needed for doctors. Many medical schools are currently trying to include data on nonacademic characteristics in their admission processes.³⁻⁵ However, the use of noncognitive selection criteria, such as aptitude tests and interviews, has been controversial and academic scores are still the main focus of admission processes.^{6,7}

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Previous studies have reported that prior academic achievement strongly predicts who will remain in medical school, performance during medical school (especially early performance), junior doctor performance, and time taken to become a specialist.^{2,8,9} Professional attributes may be assessed using personal statements, testimonials, personality and emotional intelligence tests,^{2,10} or interviews, including multiple mini-interviews.^{11,12} Although some of these methods are promising, none have been shown to be better predictors of subsequent performance than prior academic achievement.^{8,9}

Because selection processes need to be credible, fair, valid, reliable, and publicly defensible, a well-structured approach to the selection process based on predictors of good performance that are both valid and patient-relevant needs to be developed and applied.¹³ To design such a selection process, we need to determine the admission criteria that can predict future performance in the selection of appropriate students for medical education.

This study was designed to explore the admission criteria and medical student characteristics that can predict students' future performance.

METHODS

Participants

We prospectively included 1162 students who entered Seoul National University College of Medicine (SNUCM) in 2002 to 2008. SNUCM has traditionally selected high school graduates, but in 2000, SNUCM started selecting college graduates and in 2009, SNUCM started a 2-way student selection system. In the new system, high school graduates are selected for the college of medicine and college graduates for the school of medicine. Because we officially use nonacademic data, such as interview score and essay test, in the admission process for college graduates only, we included 250 students who transferred to the college of medicine from a nonmedical college to analyze the association between the admission process and student performance. In the past, as the admissions data for students who came from premedical course is comprised mainly of high school GPA and entrance exam score in Korea, we could not include these 912 students in the analysis of the predictive validity of admission criteria. However, we included these students (who came from a premedical course) in the analysis of the relevance of graduate GPA, Objective Structured Clinical Examination (OSCE) score, and postgraduate clinical performance and when comparing academic achievements according to admission strategies.

Data Collection

The data in this longitudinal cohort study included age, sex, official English score, undergraduate GPA, written test score

for the premedical course, interview score, personal statement, essay test, and affiliated major. Outcome measures were graduate GPA, OSCE score for clinical performance competency, and internship score.

Admission interviews were led by 5 faculty interviewers with general guidance about the content of the questions they should ask and a standard rating process for evaluating applicants during the interview. Interviewers used a numeric rating scale to assess applicants on multiple dimensions and overall interview performance. The interview was semi-structured and evaluation components were as follows: intrapersonal competencies (ethical responsibility to self and others, reliability and dependability, resilience and adaptability), interpersonal competencies (service orientation, social skills, and communication), thinking and reasoning competencies (critical thinking, quantitative reasoning, and scientific inquiry). Every interviewer had rated each section using A, B, C, D, and F grade and average score of 5 interviewers was calculated. For the essay test, 5 faculty admission committee members assessed applicants' essays, including information literacy and development of logic, using rating guidelines.

We used the OSCE to assess clinical performance because this tool is widely used to measure medical students' clinical competency, and evidence of its validity is increasing.^{14,15} The major evaluation components of the OSCE were overall assessment, history taking, physical examination, physician's manner, patient education, and physician-patient interaction (PPI). The internship score is the average score from each department that the medical interns rotated through during the year; a global score was given by the senior doctor at the end of their monthly rotation and evaluation components were clinical performance, medical knowledge, communication and social skills, reliability and dependability. These evaluation components were derived from survey with faculties and senior residents on requirements for good physician. We also used scores from medical school, such as the OSCE and graduate GPA, in addition to admission criteria when analyzing predictors of postgraduate clinical performance.

Statistical Analysis

We analyzed the relationship between admission criteria and outcome using correlation analysis and multiple regression analysis. Statistical analyses were performed using SPSS software (version 20.0; SPSS Inc., Chicago, IL). A $p < 0.05$ was considered significant.

Ethical Consideration

The SNUCM institutional review board provided study approval and waived the requirement for written consent.

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