

United States Medical Licensing Examination Step 1 and 2 Scores Predict Neuroradiology Fellowship Success

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Abstract

Purpose: Many neuroradiology programs use United States Medical Licensing Examination (USMLE) scores to assess fellowship candidates. The authors hypothesized that because they are taken several years before fellowship, USMLE scores would correlate poorly with success in fellowship training as measured by faculty evaluations.

Methods: USMLE scores from 10 years of neuroradiology fellows ($n = 73$) were compared with their cumulative mean E*Value scores from their fellowship years and their best-to-worst rankings within their fellowship years. If available, subspecialty certification scores were also factored as an outcome. Linear correlation and regression analyses were performed adjusting for gender, medical school site, and practice setting after fellowship.

Results: USMLE Step 1, 2, and 3 scores were available for 69, 64, and 56 fellows, respectively. Fellowship E*Value scores and rankings showed statistically significant ($P < .05$) correlations with all USMLE scores, but most strongly for Step 1 scores and E*Value grade ($r = 0.443$) and rank ($r = 0.370$). The mean USMLE Step 1 score of the top-ranked fellows (234.5) was significantly higher than that of the bottom-ranked fellows (217.7). The correlations of E*Value score and rank with USMLE Step 1 and 2 scores remained after adjusting for gender and American versus foreign medical school, but the medical school site attended also was an independent predictor of fellowship evaluations. Subspecialty certification scores did not show correlations but were underpowered ($n = 28$).

Conclusions: USMLE Step 1 and 2 scores correlated significantly with success in neuroradiology fellowship, measured by faculty assessments of the six core competencies. Using the scores as a means of assessing candidates for positions is justified.

Key Words: Fellowship, evaluation, USMLE, neuroradiology

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INTRODUCTION

The United States Medical Licensing Examination (USMLE) is a standardized test meant to ensure the competency of medical graduates. The scores are also used as one of many criteria for assessing candidates for residency and fellowship positions in training programs. The USMLE score is reported on a three-digit scale (with the exception of Step 2 Clinical Skills), with 300 being the highest possible score. Although the examination varies in difficulty and content from year to year, the

variability is statistically considered in the examination's evaluation. That is to say, the examinations are scored on a curve based on the overall performance of the year's examinees [1].

There are three steps in the USMLE. The first (Step 1) assesses an examinee's comprehension and application of basic science concepts and principles critical to practicing medicine [1]. This is typically taken after the second year of medical school. Step 2 Clinical Knowledge determines whether an examinee can apply his or her understanding of medical and clinical knowledge to patient-centered services [1]. Step 2 Clinical Skills tests medical students on their ability to perform histories and physical examinations on standardized patients and communicate to patients and clinical colleagues, consolidating the data gathered [1]. Most medical students take Step 2 in their final year of medical school. Step 3 assesses an examinee's

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ability to provide adequate patient management when taking independent responsibility for general medical care [1]. This is often completed during internship or residency.

Although there is literature suggesting that USMLE scores can be a helpful tool for the residency application selection process, by the time a candidate reaches the radiology fellowship program stage, he or she will likely be more than six years past taking components of this standardized examination (one year of internship, four years of residency) [2]. Given the time lapse, we hypothesized that USMLE scores would not be a reliable predictor of overall performance during a neuroradiology fellowship. We hypothesized that the skills that are needed to pass the USMLE do not overlap with the observational and patient and colleague interaction proficiency needed to excel at the ACGME core competencies currently used to judge neuroradiology fellowship trainees.

METHODS

The application records of neuroradiology fellows from the previous 10 years at our institution (2004-2014) were reviewed. For most candidates, complete records for all three USMLE scores (Step 1, Step 2 Clinical Knowledge, and Step 3) were available ($n = 56$), but some former fellows with incomplete records were asked to provide their scores electronically, and some fellows (mostly international medical graduates) had not taken Step 3 at the time of their fellowships. Because fellows were contacted for their scores, the study was approved by the institutional review board and was HIPAA compliant, and the requirement to obtain informed consent was waived.

The fellows were evaluated quarterly during their fellowships by neuroradiology faculty members on the basis of the E*Value evaluation program (Advanced Informatics, Minneapolis, Minnesota), whose questions corresponded with the six core competencies (medical knowledge, patient care, communication, practice-based learning, system-based practice, and professionalism) espoused by the ACGME. The scores were based on a five-point scale (Appendix 1). Each faculty member ($n = 15$) was asked to evaluate each fellow at quarterly intervals for his or her ACGME-accredited fellowship year. Five of the 15 faculty members had graduated from foreign medical schools.

The cumulative mean score of the fellows during their fellowship years (4 evaluations \times 27 items from

the E*Value \times 15 evaluators) was used to assess the success of the fellows in the neuroradiology fellowship program. Each fellow was also ranked from best to worst each year to keep variable measures from year to year controlled. Thus, the cumulative mean score and the annual ranking of each fellow were used as outcome variables.

All of the fellows who took the neuroradiology subspecialty certification examination passed on their first attempt. The ABR provided actual scores to the fellowship training director for the first five years but reported only pass or fail status for the remaining years of this study. Only 28 fellows had subspecialty certification (CAQ) scores available, which were used in the analysis.

Other variables that were studied included the gender of fellows, whether they attended foreign or American medical schools, and whether, after they left the fellowship program, they entered private practice or academic practice. The fellows were also categorized as to whether they graduated from foreign residencies, American university residencies, or American non-university-based residencies.

Linear correlation and regression analyses were performed to assess the associations between USMLE scores and the overall E*Value scores of fellows' performance. An ordered logistic regression model was used to estimate the predictability of USMLE scores on the rank within a year of a fellow's performance. Statistical significance was defined at $P < .05$. All analyses were done using Stata version 12 (StataCorp LP, College Station, Texas). Gender, medical school, residency program, and ultimate practice setting variables were also analyzed.

RESULTS

Characteristics of Neuroradiology Fellows Evaluated and Average Scores of Subgroups

Seventy-three neuroradiology fellows from the previous ten years at our institution were evaluated for the study. For four fellows, including three from the military who took a different licensure test, we had no USMLE data, and they were excluded from the data analyses. Table 1 summarizes the characteristics of the fellows. USMLE Step 1, 2, and 3 scores were available for 69, 64, and 56 fellows, respectively.

The average USMLE scores and E*Value scores by subgroup are shown in Table 2. We observed that men scored significantly higher than women on the USMLE Step 1 and USMLE Step 3 tests and E*Value. The

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