

Do Residency Selection Factors Predict Radiology Resident Performance?

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Abbreviations and Acronyms

ERAS

Electronic Residency Application Service

AOA

Alpha Omega Alpha Honor Society

USMLE

United States Medical Licensure Examination

ABR

American Board of Radiology

Rationale and Objectives: The purpose of our study is to determine what information in medical student residency applications predicts radiology residency success as defined by objective clinical performance data.

Materials and Methods: We performed a retrospective cohort study of residents who entered our institution's residency program through the National Resident Matching Program as postgraduate year 2 residents and completed the program over the past 2 years. Medical school grades, selection to Alpha Omega Alpha (AOA) Honor Society, United States Medical Licensing Examination (USMLE) scores, publication in peer-reviewed journals, and whether the applicant was from a peer institution were the variables examined. Clinical performance was determined by calculating each resident's cumulative major discordance rate for on-call cases the resident read and gave a preliminary interpretation. A major discordance was defined as a difference between the preliminary resident and the final attending interpretations that could immediately impact the care of the patient. A multivariate logistic regression was performed to determine significant variables.

Results: Twenty-seven residents provided preliminary reports on call for 67,145 studies. The mean major discordance rate was 1.08% (range 0.34%–2.54%). Higher USMLE Step 1 scores, publication before residency, and election to AOA Honor Society were all statistically significant predictors of lower major discordance rates (*P* values 0.01, 0.01, and <0.001, respectively).

Conclusions: Overall resident performance was excellent. There are predictors that help select the better performing residents, namely higher USMLE Step 1 scores, one to two publications during medical school, and election to AOA in the junior year of medical school.

Key Words: Radiology residency performance; residency performance; medical student application; USMLE Step 1; error rate.

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INTRODUCTION

Radiology remains a competitive specialty and has been bolstered by the addition of interventional radiology as an independent residency (1). As such, there continues to be a large competitive pool of applicants. Predicting which of these students will make the best radiology residents therefore remains one of the most daunting tasks for program directors and residency selection committees.

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Applicants to radiology residency programs use the Electronic Residency Application Service (ERAS) to submit their applications and supporting documents to their selected programs. This information includes demographic data, objective data including medical school transcripts, election to Alpha Omega Alpha (AOA) Honor Society, United States Medical Licensure Examination (USMLE) Step 1 and 2 scores, publications in peer-reviewed journals, and subjective data including letters of recommendation, dean's letter, and the applicant's personal statement. Residency program directors and selection committees review the information provided through ERAS to help identify which applicants they think will become the best radiology residents. The importance assigned to each piece of information varies between residencies. Grantham surveyed radiology program directors and found that an overwhelming majority considered medical school grades, class rank, and selection to AOA to be very important factors, whereas roughly half emphasized USMLE scores (2). Only a handful

of studies have investigated whether these variables can predict future success in a radiology residency. In one such study, the authors were unable to demonstrate any statistically significant value of USMLE scores in predicting performance on the American Board of Radiology (ABR) written and oral examinations (3). Another group of investigators found that medical school grades in some preclinical and clinical courses and USMLE scores could predict success on the ABR examinations but did not predict performance during radiology residency rotations (4).

To date, only ABR examination scores and subjective measures of resident performance during residency (such as rotation evaluations and retrospective faculty recall scores) have been used as markers of successful radiology residents. The purpose of this study was to determine which objective data from radiology residency ERAS applications could be used to predict resident performance as defined by objective clinical performance data.

MATERIALS AND METHODS

Our radiology residency program graduates 11–14 residents per year. As residents progress in their training, they are provided progressive amounts of autonomy with increased call frequency and case complexity during call. Similarly, the number of imaging studies interpreted per call night increases as residents progress in their training in our program. During evening and overnight call responsibilities, residents have indirect faculty supervision. Faculty members are always immediately available by phone, but not physically present. During all call shifts, residents are expected to provide preliminary interpretations of urgent imaging studies performed on inpatients, as well as routine studies if requested by the clinical service. During regular duty hours, there are circumstances wherein residents are expected to provide preliminary interpretations as well. Examples include studies performed in the emergency room and urgent studies when the attending is not immediately available for a complete interpretation. In all scenarios, studies with preliminary reports are reinterpreted by board-certified supervising radiology faculty members

who render final interpretations. At that time, the faculty member electronically adjudicates the preliminary resident interpretation, categorizing it as “agree,” “minor discordance,” or “major discordance” (5). Major discordant findings are defined as a difference in interpretation that might impact the care of the patient in the time between rendering a preliminary report and a final interpretation. Stated more plainly, these are missed critical findings or overinterpretation of minor findings as major findings. Several examples from our study are provided in Table 1.

All radiology faculty members are trained to use our major discordance software, which is integrated into our picture archiving and communication system. When a major discordance is identified, it is associated with the unique patient and imaging study. Reports of discordant findings can be generated for each resident with comparisons to group rates. Faculty mentors discuss individual discordance rates with residents during their semiannual performance reviews.

All residents invited to and interviewed by our residency program are selected through the ERAS application process. Each application is reviewed by at least three radiology faculty members, including the program director and associate program director, before selection for interview. Each applicant is then interviewed by at least three members of the resident selection committee, which comprises the program director, associate program director, core faculty, and chief residents. Multiple committee meetings rank candidates in consensus after the interview process is complete. During this process, there is often substantial disagreement regarding which criteria are most predictive of future applicant performance.

In this study, we examined which factors available at the time of applicant ranking were predictive of future applicant performance in the actual practice of radiology. Unlike prior published work, we considered the accuracy of film interpretation to be the best measure of performance rather than rotation evaluations, ABR examination scores, or Accreditation Council for Graduate Medical Education radiology milestones. We began by determining those factors that, as a consensus, faculty members felt were important. We examined whether applicants were elected to AOA Honor Society

TABLE 1. Examples of Significant Discordances

Actual Significant Discordances Reported During Study Period		
Subspecialty	Preliminary Interpretation	Final Interpretation
Neuroradiology	No acute intracranial injury	Acute right hemispheric subdural hematoma
Pediatrics	Appendix remains compressible and within upper limits of normal in caliber	Acute appendicitis
Thoracic	No central or segmental pulmonary embolism	Segmental left upper lobe pulmonary embolism
Abdominal imaging	No filling defect in collecting systems	Acute left ovarian vein thrombosis
Nuclear medicine	Radiotracer uptake within distal sigmoid and rectum suggestive of bleeding source	No abnormal tracer activity within GI tract to identify active GI bleed during image acquisition
Musculoskeletal	No acute fracture	Displaced acute comminuted intertrochanteric fracture with varus deformity of the left hip

GI, gastrointestinal.

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