Education

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PREDICTORS OF A TOP PERFORMER DURING EMERGENCY MEDICINE RESIDENCY

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☐ **Abstract—Background: Emergency Medicine (EM) res-
idency program directors and faculty spend significant time
and effort creating a residency rank list. To date, however,
there have been few studies to assist program directors in
determining which pre-residency variables best predict per-
formance during EM residency. Objective: To evaluate
which pre-residency variables best correlated with an appli-
cant's performance during residency. Methods: This was a
retrospective multicenter sample of all residents in the three
most recent graduating classes from nine participating EM
residency programs. The outcome measure of top residency
performance was defined as placement in the top third of a
resident's graduating class based on performance on the
final semi-annual evaluation. Results: A total of 277 resi-
dents from nine institutions were evaluated. Eight of the pre-
dictors analyzed had a significant correlation with the
outcome of resident performance. Applicants' grade during
home and away EM rotations, designation as Alpha Omega
Alpha (AOA), U.S. Medical Licensing Examination
(USMLE) Step 1 score, interview scores, "global rating"
and "competitiveness" on nonprogram leadership stan-
dardized letter of recommendation (SLOR), and having
five or more publications or presentations showed a signifi-
cant association with residency performance. Conclusion:**

**We identified several predictors of top performers in EM res-
idency: an honors grade for an EM rotation, USMLE Step 1
score, AOA designation, interview score, high SLOR rank-
ings from nonprogram leadership, and completion of five
or more presentations and publications. EM program direc-
tors may consider utilizing these variables during the match
process to choose applicants who have the highest chance of
top performance during residency.** © 2015 Elsevier Inc.

☐ **Keywords—education; NRMP; match; predictors; suc-
cess**

INTRODUCTION

Emergency Medicine (EM) residency program directors
and faculty spend significant time and effort creating a
residency rank list. The foremost goal in resident selec-
tion and ranking is to determine which credentials would
aid in the selection of applicants who will become
outstanding residents in their program. To date, however,
there have been few studies to assist program directors in
determining which preresidency variables best predict
performance during EM residency.

Prior studies in the EM literature have attempted to better elucidate pre-residency variables that are associated with successful completion of an EM residency. Crane and Ferraro published a study using a 5-point retrospective opinion survey of EM program directors examining the most important applicant credentials for a competitive rank (1). The investigators determined that the EM rotation grade, the interview, clinical grades, and letters of recommendations had the highest reported mean value. Hayden et al. took a step further by using a consensus faculty survey to rank order EM residents at a single center (2). They then retrospectively evaluated their residents' applications to determine which factors best correlated with faculty-assigned rank. The authors concluded that the quality of medical school attended (as determined by internal faculty consensus) and distinctive talents (class officer, star athlete, and others) were the best predictors of a successful resident. More recently, Breyer et al. retrospectively evaluated EM grade, standardized letter of recommendation (SLOR), medical school class rank, and U.S. Medical License Examination (USMLE) scores and their relationship to the applicant's position on a single program's rank list (3). They determined that higher EM rotation scores, medical school rank from the medical school performance evaluation (MSPE), and SLOR global assessments were positively correlated with their rank list, but none of these correlations was considered strong. Additionally, the study was not designed to evaluate applicant performance during residency.

To date, there are no multi-institutional data to guide evaluation of an applicant's credentials that can be readily used by program directors. The objective of this study was to evaluate which preresidency variables best correlated with an applicant's performance during residency based on the end of residency evaluation.

METHODS

Study Design

This was a retrospective cohort study looking at data from the three most recent graduated classes of nine participating residency programs from United States Accreditation Council for Graduate Medical Education (ACGME)-accredited EM residencies. Program directors who attended a didactic session at the Council of Residency Directors in EM Academic Assembly in 2012 and 2013 were asked to volunteer to participate in the study, which was coordinated through the EMERG network (Emergency Medicine Education Research Group). Each participating program's institutional review board approved the study protocol.

Study Setting and Population

A sample of the three most recent graduated classes of residents from each participating EM residency program was chosen. All residents from each program for whom complete data were available were included for analysis.

Study Protocol

For each graduate, pre-specified *predictor* variables (Table 1) were extracted from the applicant's:

- Residency application from the Electronic Residency Application Service (ERAS)
- Interview scores assigned by residency faculty, stratified by tier (top, middle, bottom third)
- Position on the residency's National Resident Matching Program's (NRMP) rank list stratified by tier (top, middle, bottom third)

Medical school rankings were based on the 2013 *US News and World Report* Top Medical Schools report using the research ranking, primary care ranking, and the average of both rankings.

To limit the potential for bias when reviewing resident outcomes, the end of residency semiannual evaluation was chosen as the most objective measure of residency performance from each program. All participating programs indicated that they utilized a numerical scoring system for each resident across each of the six ACGME core competencies. The scores for each competency at all sites was a composite of all monthly evaluations, nursing feedback, and direct observation, as well as faculty input. Each resident was categorized into top, middle, or bottom third of their class based on the sum of the resident's total scores for each of the core competencies. Thus, the outcome measure of a top performing resident was defined as those with the top third total scores in comparison with the rest of their class. The classification of "top third" was chosen because this measure was utilized in several other studies, and program directors were comfortable with this category delineation.

Statistical Analysis

Average clerkship score was calculated as a mean score of third-year rotations in Surgery, Medicine, Pediatrics, Obstetrics, Family Medicine, and Psychiatry. For medical schools where the clerkship was graded on a "pass/fail only" basis, those data were excluded from the analysis. Home and away EM clerkship grades were categorized as honors and other. Medical school ranking for research and primary care were averaged, and each measure was reported as a continuous variable. Publications and presentations were totaled and used as a composite variable