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# Predictive Validity of Family Medicine Resident's Performance at Induction with Their Future Performance During Residency

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## ABSTRACT

**Objective:** To determine the predictive validity of induction assessment scores of family medicine residency program for performance in final year of residency.

**Study Design:** Psychometric (predictive-validity) study.

**Place and Duration of Study:** The Aga Khan University Hospital, Karachi, from 2008 to 2014.

**Methodology:** All family medicine residents were evaluated. Family Medicine Residency induction assessment scores were used as independent predictor variables, whereas resident assessment scores during the final year residency program were used as dependent or outcome variables. Data was analyzed using SPSS version 19. Linear regression was used to determine predictive validity of induction scores as independent variables with outcome variables at 95% confidence level.

**Results:** There were 33 residents. MBBS scores accounted for 30.1% of variance in final year Objective Structured Clinical Exam (OSCE) scores; whereas, induction written test accounted for 37.1% of variance in final year written test. Induction communication skill scores did not correlate with in-training communication skill scores or with the final year OSCE scores. Induction professionalism scores accounted for 13.7% of the variation in final year OSCE scores, but not with in-training continuous professionalism scores.

**Conclusion:** Induction knowledge scores have acceptable predictive value for future knowledge and its application. Other valid and reliable assessment methods, such as multiple mini-interviews, should be explored for assessment of non-cognitive domains at induction.

**Key Words:** Family medicine. Residency. Outcome competencies. Predictive validity.

## INTRODUCTION

Decisions regarding selection of candidates for enrolment into a residency program should be valid, reliable, credible, transparent, and fair. A number of assessment methods are used globally for selection into residency program which includes written tests, interviews, narrative comments from undergraduate clinical rotations, clinical grades, letters of recommendation, and multiple mini-interviews.<sup>1-3</sup> One-best multiple choice questions (MCQs) is a widely used method for assessment of the cognitive domain.<sup>4</sup> The non-cognitive domains are usually assessed by interviews at induction.<sup>5,6</sup> Best selection practices, however, involve identification of the competencies required for the job based on job analysis, use of reliable tools to assess identified competencies and establishment of predictive validity of selection decisions against future performance.<sup>1</sup>

The predictive validity of induction methods for selection including induction structured interviews versus resident's

clinical performance scores during residency, and induction knowledge scores versus exit exam scores have been studied.<sup>7,8</sup> Situational judgment test and multiple mini-interview test were found to be predictive of end of training assessment scores for general practice trainee selection in Australia.<sup>9</sup> Predictors of success in otolaryngology residency applicants showed no correlation with letters of recommendation, experience as an intern and a weak correlation with rank of medical school and faculty interviews.<sup>10</sup> Studies in family medicine residency induction show that selection scores are predictive of vocational exam scores.<sup>3,11,12</sup>

To date, the induction process in family medicine residency at Aga Khan University (AKU) has not been evaluated for its effectiveness in predicting end of training outcome scores. Considering the pivotal role of this specialty in the healthcare system of Pakistan, selection of future family physicians, who exhibit appropriate competencies, has become increasingly essential. The program demands highly competent individuals to take this nascent specialty forward in the country. This requires a robust induction process, appropriate enough to produce such results. The results of this study will help in evaluating the current induction assessment practices at AKU for family medicine residency to select appropriate candidates and may facilitate to identify the most appropriate criteria for induction.

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The aim of this study was to determine if induction assessment scores are predictive of family medicine resident's performance in final year of residency.

## METHODOLOGY

This was a predictive-validity study using linear regression. Ethical approval was taken from the institutional Ethical Review Committee. Residents' names were replaced by serial numbers before data entry. All information was kept confidential. The data was only available to the Residency Director and Administrative Assistant. Residents graduating from the family medicine residency program at AKU from 2008 to 2014 were included.

Induction assessment scores were used as independent or predictor variables. It comprised of three scores. Final year MBBS exam scores included that at the time of exit from medical school, the Postgraduate Medical Education (PGME) AKT (applied knowledge test) was a theory exam based on single-best answers to 100 clinical scenarios, the induction interview assessed knowledge through problem solving scenarios, communication skills through interpersonal relationship and professionalism through scenarios evaluating ethics, resilience, self-reliance and reflection. These attributes were scored on the interview sheet using a five-point Likert scale. For the present study, sub-components of interview scores on problem solving (knowledge), communication skills, and professionalism were used independently as predictor variables.

Outcomes or dependent variables were based on resident performance in the final year of residency. The outcome assessment also comprised of the following three: 1- Final year PGME AKT exam consisted of 100 scenario-based one-best MCQs. The problems included common Family Medicine clinical scenarios that they were expected to encounter in their daily practice. 2- Final Year OSCE was composed of 10 integrated patient problem scenarios including consultation skills, data gathering, examination and management; thus covering knowledge, skills, and attitudes on all stations. 3- Family medicine faculty members assessed residents who rotated with them in the final year, using a structured in-training continuous assessment (CA) form

composed of three components – medical expertise, communication skills, and professionalism. The scores from these components were used independently as outcome measures of these attributes.

Data of quantitative predictor and outcome variables were entered in SPSS version 19. Descriptive statistics were used to determine mean scores, standard deviation, and minimum and maximum scores for each variable. Linear regression was used to determine the predictive validity of the predictor variables at the time of induction with the outcome variables in final year residency at 95% confidence level, using the following equation: Outcome variable = Constant + Beta (predictor variable).

## RESULTS

Data of all graduates (n = 33; 100%) from 2008-2014 were selected. Twenty-nine (88%) were women and 4 (12%) were men. All the residents were graduates of medical colleges from Pakistan, other than AKU. Majority 31 (94%) graduated from medical colleges of Sindh, in which province AKU is located. Mean scores, standard deviation, and minimum and maximum scores for each variable are given in Table I.

Table II shows the linear regression analysis of MBBS scores, induction PGME AKT and induction interview knowledge component scores as predictor variables with CA medical expertise component, final year PGME AKT and final year OSCE scores as outcomes. MBBS scores accounted for 30.1% of the variance in final year OSCE scores (p = 0.001) but accounted for 5% of the variance in PGME AKT scores (p = 0.188). Induction PGME AKT scores accounted for 2.8% of the variance in knowledge part of in-training continuous assessment (p = 0.352) and 9.7% of the variance in final year OSCE scores (p = 0.078). However, induction PGME AKT scores accounted for 13.8% of the variance in final year PGME AKT scores (p = 0.034, Table II).

Interview induction knowledge component accounted for 4.5% of variance in in-training medical expertise scores (p = 0.237) and 5.3% of variance in final year PGME AKT scores (p = 0.196, Table II).

**Table I:** Descriptive statistics of all variables.

	Number	Minimum	Maximum	Mean	Standard Deviation
Total MBBS Marks	33	56.17	78.98	65.99	4.97
Aga Khan University Induction Test Score	33	11.25	66.25	44.78	11.33
Induction Interview: Knowledge component	33	1.71	4.00	3.09	0.49
Induction Interview: Communication component	33	2.25	4.00	3.24	0.44
Induction Interview: Professionalism component	33	2.33	4.00	3.17	0.39
CA <sup>I</sup> Medical Expertise	33	3.40	4.40	3.90	0.24
CA <sup>I</sup> Communication	33	3.60	4.40	3.97	0.22
CA <sup>I</sup> Professionalism	33	3.82	4.64	4.20	0.20
Final Year PGME AKT <sup>II</sup>	33	47.73	82.68	63.36	7.77
Final Year OSCE <sup>III</sup>	33	62.63	95.00	76.48	6.73

<sup>I</sup> Continuous Assessment; <sup>II</sup> Postgraduate Medical Education Applied Knowledge test; <sup>III</sup> Objective Structured Clinical Exam.

**Table II:** Prediction of outcome scores for knowledge using linear regression.

Induction scores	Outcome scores		
	CA <sup>I</sup> medical expertise	Final year PGME AKT <sup>II</sup>	Final year OSCE <sup>III</sup>
MBBS scores:			
Correlation (R)	0.153	0.235	0.549**
Coefficient of determination (R <sup>2</sup> )	0.023	0.055	0.301
Constant	3.415	39.142	27.386
Beta	0.007	0.367	0.744
p-value	0.396	0.188	0.001
Induction PGME AKT <sup>II</sup> :			
Correlation (R)	0.167	0.371*	0.311
Coefficient of determination (R <sup>2</sup> )	0.028	0.138	0.097
Constant	3.740	51.997	68.205
Beta	0.004	0.254	0.185
p-value	0.352	0.034	0.078
Induction Interview: Knowledge component:			
Correlation (R)	0.212	0.231	0.082
Coefficient of determination (R <sup>2</sup> )	0.045	0.053	0.007
Constant	3.581	52.113	73.014
Beta	0.102	3.645	1.123
p-value	0.237	0.196	0.650

<sup>I</sup> Continuous Assessment; <sup>II</sup> Postgraduate Medical Education Applied Knowledge test; <sup>III</sup> Objective Structured Clinical Exam; \*\*Correlation; is significant at the 0.01 level; \* Correlation is significant at the 0.05 level.

**Table III:** Prediction of outcome scores for communication skills and professionalism using linear regression.

Induction scores	Outcome scores		
	CA <sup>I</sup> Communication	CA <sup>I</sup> Professionalism	Final year OSCE <sup>II</sup>
Induction Interview: Communication component			
Correlation (R)	0.054	0.170	0.162
Coefficient of determination (R <sup>2</sup> )	0.003	0.029	0.026
Constant	3.886	3.952	84.522
Beta	0.027	0.077	- 2.480
p-value	0.764	0.344	0.367
Induction Interview: Professionalism component			
Correlation (R)	0.245	0.323	0.371*
Coefficient of determination (R <sup>2</sup> )	0.060	0.104	0.137
Constant	3.538	3.679	56.289
Beta	0.138	0.165	6.373
p-value	0.169	0.067	0.034

<sup>I</sup> Continuous Assessment; <sup>II</sup> Objective Structured Clinical Exam; \* Correlation is significant at the 0.05 level.

Table III shows the linear regression analysis of induction interview communication and professionalism component scores as predictor variables with CA communication and professionalism components, and final year OSCE scores as outcomes. Induction communication skill accounted for 0.3% of the variance in in-training communication skill scores (p-value= 0.764) and 2.6% of the variance in final year OSCE scores (p = 0.367). Induction professionalism scores of interview accounted for 10.4% of the variance in in-training continuous professionalism scores (p = 0.067), but accounted for 13.7% of variance in final year OSCE scores (p = 0.034, Table III).

The equations for prediction of the three outcome variables with statistically significant results on linear regression were as follows:

i. Final Year PGME AKT Score = 51.977 + 0.254 (Induction PGME AKT Score).

ii. Final Year OSCE Score = 27.386 + 0.744 (MBBS Score).

iii. Final Year OSCE Score = 56.289 + 6.373 (Induction Interview Professionalism Score).

## DISCUSSION

The results of this study indicate that majority of the current induction criteria being used to select residents are not predictive of future performance. There are many studies that have looked at induction variables predicting outcomes.<sup>3,12,13</sup>

The results also show that the predictive power of MBBS induction scores strongly correlated with final year OSCE scores. This can be explained by the fact that MBBS scores are holistic in nature and reflective of the sum of knowledge skills and attitude at the point of exit from medical school. These findings are supported by a study done on paediatric resident's performance<sup>2</sup>; but are in contrast to other studies, which showed that medical college academic records scores did not correlate with subsequent clinical performance in a surgical residency.<sup>14,15</sup> A systematic review demonstrated that previous academic performance is a reasonable predictor of success in medical school and accounts for 6% of variance in postgraduate performance.<sup>16</sup>

Induction PGME AKT scores correlated well with final year PGME AKT scores; both these assessment tools are primarily assessing applied knowledge; and hence, show correlation.

Professionalism was the only aspect of the induction interviews which predicted performance in the final year OSCE indicating that OSCE encompass knowledge, skills and professionalism. Induction professionalism scores did not correlate with in-training professionalism scores. One reason may be that interviews do not assess the competencies that the faculty would like a resident to gain during residency. This is similar to a study by Dubovsky, where induction interview scores did not correlate with performance ratings in fourth year postgraduate trainees.<sup>17</sup>

Literature has shown that structured interviews do not always yield a higher overall reliability than unstructured interviews. Often interviewers rate a single domain despite the presence of multiple domains.<sup>6,10,18</sup>

The relatively low predictive ability of interview scores for predicting knowledge and communication skills makes it a poor tool for induction in its current format. This suggests a greater need for specific interview questions, extensive interviewer training, and post interview analysis for monitoring the process.

The limitation of the present study is that it encompasses a single institution and a single residency program.

### CONCLUSION

The induction theory exam knowledge scores have an acceptable predictive value for future knowledge and should continue to be used. Structured interviews, as an assessment method for measuring non-cognitive domains, need modification. Other valid and reliable assessment methods, such as multiple mini-interviews, should be explored for assessment of non-cognitive domains at induction.

### REFERENCES

1. Plint S, Patterson F. Identifying critical success factors for designing selection processes into postgraduate specialty training: the case of UK general practice. *PMJ* 2010; **86**:323-7.
2. Ozuah OP. Predicting resident's performance: A prospective study. *BMC Med Educ* 2009; **2**:1-4.
3. Lillis S. Do scores of the selection process for vocational general practice training predict scores in vocational examinations. *JPHC* 2009; **1**:114-8.
4. Benbassat J, Baumal R. Uncertainties in the selection of applicants for medical school. *Adv in Health Sci Educ* 2007; **12**:509-21.
5. Dowell J, Lynch B, Till H, Kumwenda B, Husbands A. The multiple mini-interview in the UK context: 3 years of experience at Dundee. *Med Teach* 2012; **34**:297-304.
6. Blouin D, Day AG, Pavlov A. Comparative reliability of structured versus unstructured interviews in the admission process of a residency. *JGME* 2011; **3**:517-23.
7. Van Leeuwen YD, Mol SSL, Pollemans MC, Grol R, Drop MJ. Selection of postgraduate training for general practice: the role of knowledge test. *BJGP* 1997; **4**:359-62.
8. Olawaiye A, Yeh J, Withiam-Leitch M. Resident selection process and prediction of clinical performance in an obstetrics and gynecology program. *Teach Learn Med* 2006; **18**:310-5.
9. Patterson F, Rowett E, Hale R, Grant M, Roberts C, Cousans F, et al. The predictive validity of a situational judgement test and multiple-mini interview for entry into postgraduate training in Australia. *BMC Med Educ* 2016; **16**:1-8.
10. Chole RA, Ogden MA. Predictors of future success in otolaryngology residency applicants. *Arch Otolaryngol Head Neck Surg* 2012; **138**:707-12.
11. Ahmed H, Rhydderch M, Matthews P. Do general practice selection scores predict success at MRCGP? An exploratory study. *Educ Prim Care* 2012; **23**:95-100.
12. Cho JJ, Kim JY. Predictive value of the Korean academy of family medicine in-training examination for certifying examination. *Korean J Fam Med* 2011; **32**:352-57.
13. Moruzi CK, Norman GR. Validity of admissions measures in predicting performance outcomes: The contribution of cognitive and non-cognitive dimensions. *Teach Learn Med* 2009; **14**:34-42.
14. Brothers TE, Wetherholt S. Importance of the faculty interview during the resident application process. *J Surg Educ* 2007; **64**: 378-85.
15. Borowitz SM, Saulsbury FT, Wilson WG. Information collected during the residency match process does not predict clinical performance. *Arch Pediatr Adolesc Med* 2000; **154**:256-60.
16. Ferguson E, James D, Madeley L. Factors associated with success in medical school: systematic review of the literature. *BMJ* 2002; **324**:952-7.
17. Dubovsky SL, Gendel MH, Dubovsky AN, Levin R, Rosse J, House R. Can admissions interviews predict performance in residency? *Acad Psychiatry* 2008; **32**:498-503.
18. Lee AG, Golinic KC, Oetting TA, Beaver HA, Boldt HC, Olson R, et al. Re-engineering the resident applicant selection process in ophthalmology: a literature review and recommendations for improvement. *Surv Ophthalmol* 2007; **53**:164-76.

