Association between Knowledge and Performance in Clerkships and USMLE Step 2 CK Scores: Implications for Counseling and Academic Decision-making

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Background

Step 2 CK scores are of increasing importance in medical student career planning. In the National Resident Matching Program 2014 Program Director Survey, Step 1 scores were the highest-rated among 33 factors used in screening applicants to be interviewed (94% cited it with a mean rating of 4.1 on a 5 point Likert scale); Step 2 scores were rated fourth in importance (80% cited it, mean rating of 4.1). When citing factors for ranking a given applicant, Step 1 scores ranked 5th (80% cited, with mean rating of 4.1) and Step 2 CK scores ranked 7th (71% cited, with mean rating of 4.1) Previous studies have shown a relationship between Step 2 scores and subsequent board certification, and that women outperformed men in most content areas in Step 2. The purpose of this study was to examine the association between knowledge and performance in clerkships, as measured by final clerkship grade and Step 2 scores after adjusting for background factors, such as preclinical knowledge.

2016 Main Residency Match By the Numbers
http://www.nrmp.org/wp-content/uploads/2016/03/Match-By-the-Numbers.pdf

		Change From 2015
Positions		
Total Positions*	30,750	↑538 (1.8%)
PGY-1 Positions*	27,860	↑567 (2.1%)
Total Positions Filled*	29,572	↑666 (2.3%)
PGY-1 Positions Filled*	26,836	↑584 (2.2%)
Unfilled Positions	1,178	↓128 (9.8%)
Unfilled Positions Offered in SOAP	1,097	↓96 (8.0%)
Percent of Positions Filled	96.2	↑ 0.5%
Percent of PGY-1 Positions Filled	96.3	↑ 0.1%
Applicants		
Registered Applicants*	42,370	↑1,036 (2.5%)
Active Applicants*	35,476	↑571 (1.5%)
Applicants Matched to PGY-1 Positions*	26,836	↑584 (2.2%)
Percent Applicants Matched to PGY-1 Positions	75.6	↑ 0.4%
Percent of Matched Applicants Matched to Top 3	79.7	↑ 0.6%
Percent of Matched Independent Applicants Matched to Top 3	80.5	↑ 0.2%
U.S. Allopathic Seniors		
Active U.S> Allopathic Seniors*	18,187	↑162 (0.9%)
PGY-1 Positions Filled by U.S. Allopathic Seniors*	17,057	↑125 (0.7%)
% U.S. Allopathic Seniors Matched to PGY-1 Positions	93.8	↓ 0.1%
% U.S. Allopathic Seniors Matched Within Top 3 Choices	79.2	↑ 0.8%
% of PGY-1 Positions Filled by U.S. Allopathic Seniors	61.2	↓ 0.8%
Couples		
Active Couples*	1,046	↑11 (1%)
Couples Match Rate*	95.7	↑ 0.9%

*Highest on record

Graphs: Results of the 2014 NRMP Program Director Survey
http://www.nrmp.org/wp-content/uploads/2014/09/PD-Survey-Report-2014.pdf

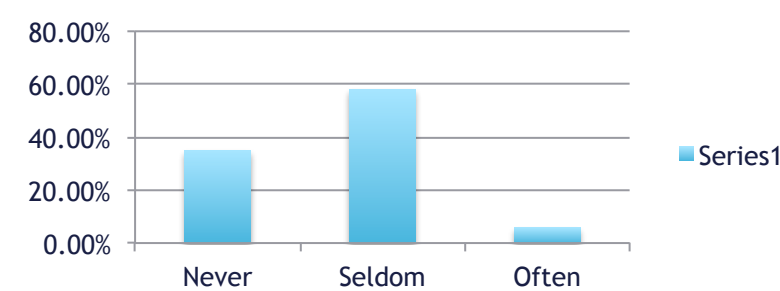**Step 1 Scores Required? N=1,746**
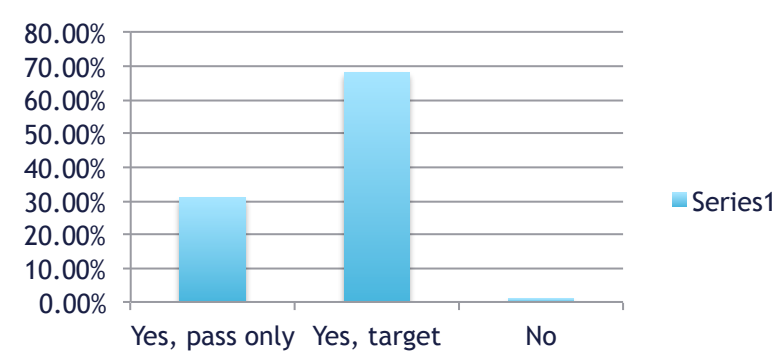
Would your program consider applicants who fail Step 1 on first attempt? N=1,601
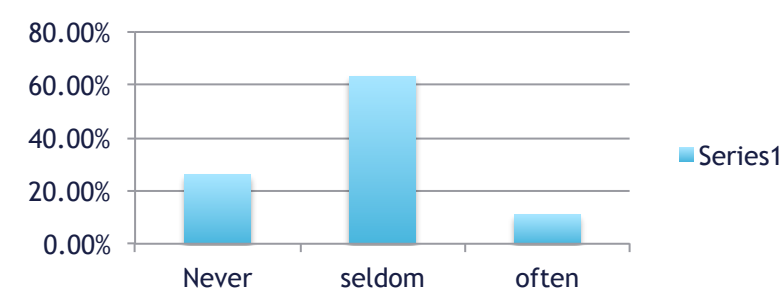
Step 2 CK Scores Required? N=1,672

**Would your program consider applicants who fail Step 2 CK on first attempt? N=1,417**

Methods

Our sample was comprised of 1,564 SKMC students who took Step 1 for the first time between 2010 and 2015. The demographics were as follows: mean age at matriculation 23.4, white 64.5%, Asian 16.5%, Indian/Pakistani 10.8%, Hispanic 5.3%, African-American 2.4%, other ethnic groups 14.6%, and women 50.4%. The mean Step 1 score was 227.2. Multiple linear regression was performed on Step 2 scores using the following as predictors: demographics, Step 1 scores, NBME Subject Examination scores in 6 clerkships, faculty ratings of students' clinical performance (independent of NBME Exam scores) in 6 clerkships, and timing of taking Step 2 in the curriculum.

Results – Predictive Model

We found 10 variables significantly related to Step 2 scores in a full regression model with an r-square of 0.68 (p<0.00001). All NBME exam scores had significant (p<0.0001) weights in the model, with Medicine being the highest, followed by Ob/Gyn, Pediatrics, Family Medicine, Surgery, and Psychiatry. Only the MCAT Physical Science subtest reached significance with p<0.03. The regression weight for Step 1 was significant (p<0.0001) and its standardized regression coefficient indicated that it was the most important of the 10 predictors. While the majority (53.5%) of students took Step 2 in June, July or earlier at the end of their third year, students who delayed taking Step 2 until later in their fourth year experienced a small, but significant (p<0.0001) decline of about 0.80 points per month. Pediatrics was the only clerkship whose faculty ratings of students' clinical performance yielded a significant (p<0.03) weight in the regression model. Gender and ethnicity were not found to be significant factors.

Predicted vs. Actual USMLE Step 2 Scores w/0.95 CI
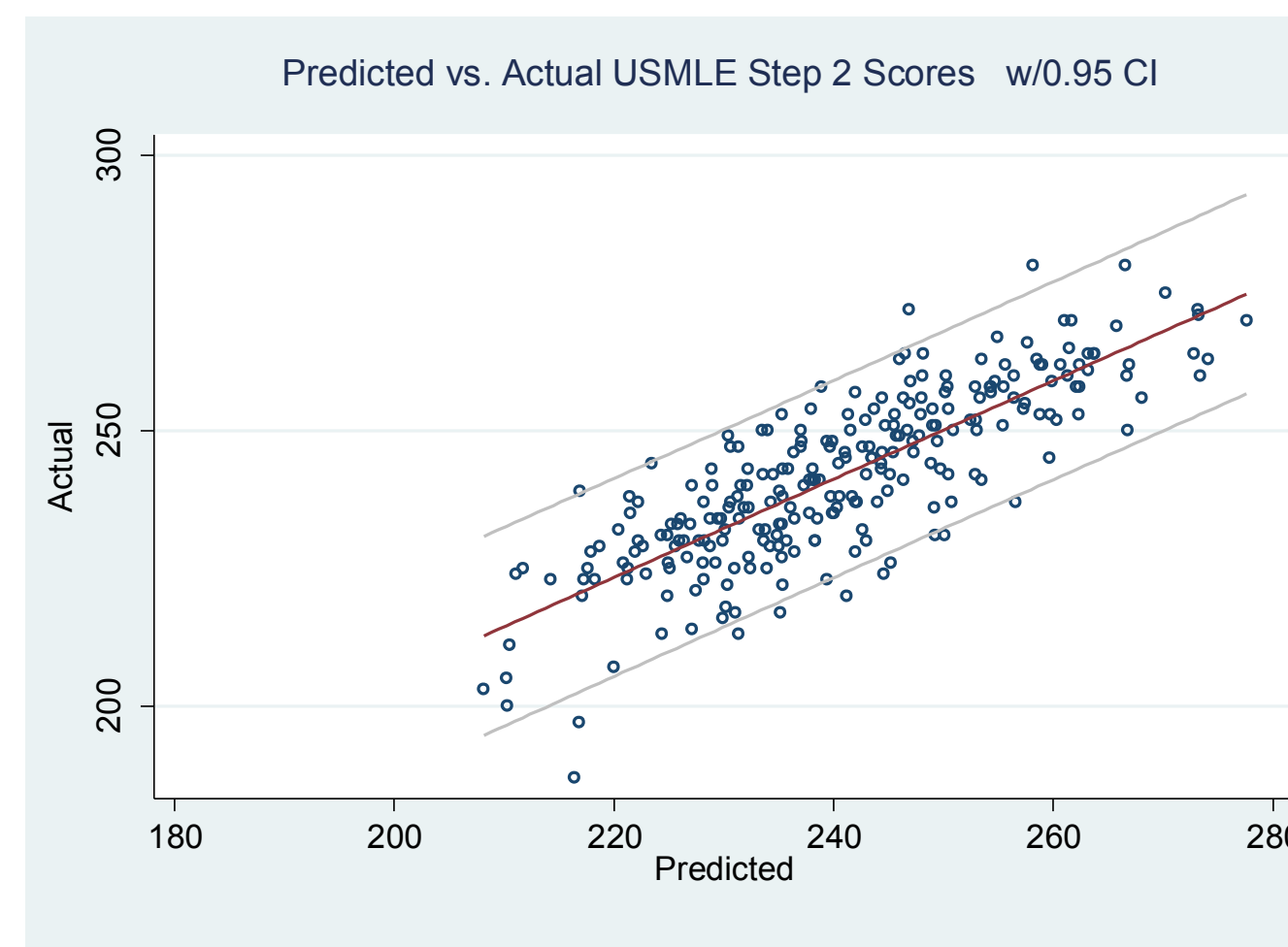
Most Important Predictors of Step 2

	Standardized Coefficient	p
USMLE Step 1	0.24	0.0001
NBME Medicine	0.16	0.0001
NBME Ob/Gyn	0.16	0.0001
NBME Pediatrics	0.14	0.0001
NBME Surgery	0.11	0.0001
NBME Family Medicine	0.09	0.0001
Delay (months) taking Step 2 after June	-0.09	0.0001
NBME Psychiatry	0.08	0.0001
Pediatrics Clinical	0.04	0.02
MCAT Physical Science	0.01	0.01

Not statistically significant: Age, Gender, Ethnicity, MCAT Biology & Verbal, and clinical performance in other clerkships.

Linear Regression Model to Predict USMLE Step 2 Score

	Regression Coefficient
Constant	42.87
USMLE Step 1	0.21
NBME Medicine	0.39
NBME Ob/Gyn	0.39
NBME Pediatrics	0.32
NBME Surgery	0.26
NBME Family Medicine	0.25
Delay (months) taking Step 2 after June	-0.81
NBME Psychiatry	0.2
Pediatrics Clinical (1 to 4)	1.55
MCAT Physical Science	0.51

Results – Risk of Failure

The overall risk of failure for all students is 2.43 percent. Students with predicted scores under 222 have a 25 percent risk of failure, which is a relative risk of 10. Below 217 the risk of failure rises to 50 percent – a relative risk of over 20.

Risk of Failing Step 2 as a Function of Predicted Score
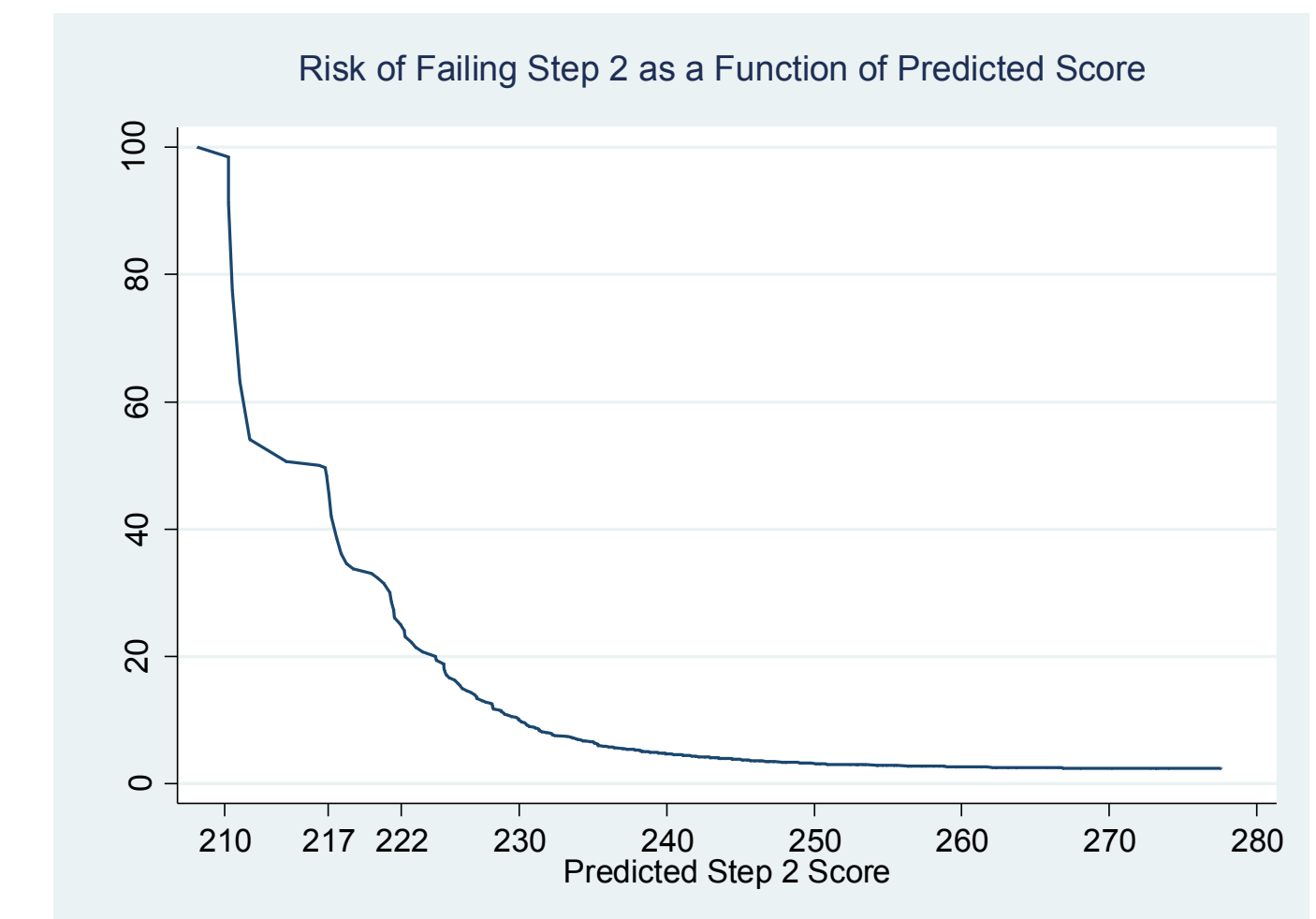
Discussion

Despite the intent of the USMLE examination as establishing minimal competence for licensure, both Step 1 and Step 2 scores are rated highly in terms of factors influencing candidacy and ultimate ranking. Although our research demonstrates correlation of multiple predictors for Step 2 scores, students' Step 1 scores and their scores on the clerkship NBME Subject exams were the strongest. These findings raise questions in the context of the changing landscape in competition for residency slots, and the new "scramble" system for spots that have been unfilled in the Match. Additionally they may also have implications for the development of new curricula in which active learning and time for studying are emphasized.

The strong associations between knowledge acquired in clerkships and performance on Step 2, after adjusting for preclinical knowledge, may have implications for curriculum design as residency program directors place increasing emphasis on Step 2. Students seeking highly competitive residencies, as well as students with average or below-average academic records need to pay close attention to any weakness in their NBME clerkship exam scores.

References

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2. National Resident Matching Program, Data Release and Research Committee: Results of the 2014 NRMP Program Director Survey. National Resident Matching Program, Washington, DC. 2014.

3. Ogunyemi D, Taylor-Harris DS. Factors that Correlate with the U.S. Medical Licensure Examination Step-2 Scores in a Diverse Medical Student Population. Journal of The National Medical Association. Vol 97, no 9. September 2005. 1258-1262