ScholarRx Research USMLE-Rx Qmax as a Predictor of USMLE Outcomes

Jesse Burk Rafel, MD, MRes New York University Jesse.Rafel@nyulangone.org





Disclosures

- Research consultant for ScholarRx
- No other relevant financial disclosures

About Me

- Resident
 - 2nd Year, Internal Medicine, NYU Langone
- ScholarRx
 - Research and MERIC Committees
- NBME
 - Invitational Conference on USMLE Scoring (InCUS)
 - Re-examining Exams: NBME Effort on Wellness (RENEW) task force
- UME-GME Transition
 - Co-investigator, NYU Transition to Residency Advantage, an AMA Reimagining Residency grant
- Scholarly Publishing
 - Assistant Editor for Trainee Engagement at Academic Medicine
- Research on high-stakes exams

Study Behaviors and USMLE Step 1 Performance: Implications of a Student Self-Directed Parallel Curriculum

Jesse Burk-Rafel, MD, MRes, Sally A. Santen, MD, PhD, and Joel Purkiss, PhD

Abstract

Purpose

To determine medical students' study behaviors when preparing for the United States Medical Licensing Examination (USMLE) Step 1, and how these behaviors are associated with Step 1 scores when controlling for likely covariates.

Method

The authors distributed a study-behaviors survey in 2014 and 2015 at their institution to two cohorts of medical students who had recently taken Step 1. Demographic and academic data were linked to responses. Descriptive statistics, bivariate correlations, and multiple linear regression analyses were performed.

Results

Of 332 medical students, 274 (82.5%) participated. Most students (n = 211; 77.0%) began studying for Step 1 during their preclinical curriculum, increasing their intensity during a protected study period during which they averaged 11.0 hours studying per day (standard deviation [SD] 2.1) over a period of 35.3 days (SD 6.2). Students used numerous third-party resources, including reading an exam-specific 700-page review book on average 2.1 times (SD 0.8) and completing an average of 3,597 practice multiplechoice questions (SD 1,611). Initiating study prior to the designated study period, increased review book usage,

and attempting more practice questions were all associated with higher Step 1 scores, even when controlling for Medical College Admission Test scores, preclinical exam performance, and selfidentified score goal (adjusted $R^2 = 0.56, P < .001$).

Conclusions

Medical students at one public institution engaged in a self-directed, "parallel" Step 1 curriculum using third-party study resources. Several study behaviors were associated with improved USMLE Step 1 performance, informing both institutional- and student-directed preparation for this high-stakes exam.

Multiple linear regression	No. of students included in model	Variable	Coefficient (95% Cl)ª	Standardized $\boldsymbol{\beta}$	<i>P</i> value ^b
Control model ^d	232	(Constant)	-41.5 (-80.9, -2.1)		
		Female sex	-1.82 (-5.10, 1.46)	-0.06	NS
		MCAT score	0.95 (0.45, 1.51)	0.19	< .001
		Preclinical score	1.92 (1.53, 2.31)	0.49	< .001
		Score goal	0.31 (0.19, 0.43)	0.27	< .001

Summary of Prior Work on USMLE Step 1

- When controlling for demographics and prior academic performance:
 - **Early study +** 4.2-point Step 1 score increase (95% CI: 0.6-7.9)
 - Cover-to-cover "First Aid for Step 1" reading > 2.3-point increase (95% CI: 0.3-4.3)
 - 500 additional **unique practice questions** → 1.8-point increase (95% CI: 0.9-2.6)
- Early study + additional First Aid review + additional question bank
 predicted to score 13.5 points higher
- Observed 1-point score increase per 286 additional unique questions was an effect size comparable to prior studies (1-point increase per 200-445 questions — Kumar 2015; Deng 2015; Johnson 2017)

ScholarRx Research

- Aim
 - Use ScholarRx data to answer scholarly questions that advance the field of medical education
- General research questions
 - Prediction
 - Spaced repetition
 - Question feedback design and retention
 - Student demographics and performance

Qmax Prediction Model: Intro

- Research question
 - How are USMLE-Rx Qmax usage and performance associated with USMLE performance when controlling for likely confounders, such as prior academic performance?
- What is known
 - Student demographics, prior academic performance, study behaviors, and performance on practice questions / tests correlate with USMLE performance
- What is not known
 - If such relationships exist among current Qmax users, who include a diverse mix of MD/DO and US/IMG students
 - How such information could be used to provide behavior-modifying advice to students preparing for the USMLE

Qmax Prediction Model: Methods

- Incentivized surveys of USMLE-Rx users in 2015 and 2018
 - n = 389 total respondents
 - Undergraduate GPA, MCAT score, MD/DO program, IMG status, school location, USMLE Step 1 and/or 2CK score
- Survey data linked to users' USMLE-Rx Qmax usage data
 - Questions completed (total, repeated, and non-repeated)
 - Percent of questions answered correctly
- Analysis
 - Univariate, bivariate, and multiple linear regression, including interaction analysis

Qmax Prediction Model: Findings





Qmax Step 1 Questions, Total Completed Mean 1833 questions (SD 1033, n = 315) **Qmax Step 1 Questions, Percent Correct** Mean 72.0% correct (SD 12.4%, n = 315)



USMLE Step 1 Score Mean 232.6 (SD 20.3, n = 389)



Relationship between Qmax and USMLE Step 1 score

	Coefficient	95% CI	Std. β	P value	Model R	Adj. <i>R</i> ²
Undergraduate GPA	16.3	(6.8-25.9)	.25	***		
MCAT Total Score	1.4	(0.9-2)	.38	***	.54	28.5%

Qmax Prediction Model: Summary

- In this analysis, both the number of Qmax practice questions completed and the percent correct were significantly correlated with USMLE Step 1 exam performance
 - Completion of 340 questions (or 260 non-repeated questions) was associated with a 1 point increase in USMLE scores, even when controlling for students' baseline GPA and MCAT
 - Effect was driven by completion of non-repeated questions
 - Percent correct appears to be a stronger predictor of performance
 - Substantial variance remains unexplained
- More work is needed to explore interaction, additional unmeasured confounders, and improve predictive performance by incorporating additional data (e.g., practice exams)

ScholarRx Research: Next Steps

- Prediction 2.0 (in process)
- Spaced repetition (in process)
- Question feedback design and retention
- Student demographics and performance
- [Your research question here!]
 - Let's work together to answer it!

References

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