



The Effect of Extra-Departmental and Subspecialty Rotations on Medical Student NBME Exam Performance During the 3rd Year Surgery Clerkship

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ABSTRACT

Background: The goal of the 3rd year surgical clerkship is to allow the student to acquire the basic surgical skills and knowledge that will contribute to their general professional education. The student should acquire the medical knowledge to appropriately care for the general surgical patient in the preoperative, intraoperative, and postoperative settings. In addition, students who pursue careers outside of surgery should be able to obtain the knowledge necessary to refer when appropriate. Required testing of this knowledge in the form of the standardized NBME surgery shelf exam and oral examinations is a mandatory requirement for successful completion of the 3rd year clerkship. During the clerkship rotation, the student may spend as much as 8 weeks or as little as 4 weeks within the Department of Surgery. The goal of this project is to examine the possible effect of time spent away from the Department of Surgery on medical student performance as measured by the NBME Surgery Content Examination.

Study Design/Methods: An IRB approved retrospective review medical students rotating on the surgery clerkship between July 2005-June 2008. The following data points were assessed: age, sex, ethnicity, clerkship rotations, NBME exam score, oral exam score, time of year taking surgery (1st half vs. 2nd half), USMLE Step 1 scores, preclinical grades, MCAT and SAT score, overall clerkship grade, and choice of matched specialty (surgical vs. nonsurgical) if known. Statistical analysis was performed to identify those factors predictive of higher NBME score.

Results: A total of 359 student files were identified. See tables for demographic breakdown. With the exception of male sex in one subgroup, the groups were statistically similar with regards to sex, ethnicity, and class rank. On univariate analysis, there was no significant difference in shelf score or percentile when examining the time in the department of surgery. There was a trend, however, to a higher score with less time in the department. In addition, there was a statistically significant improvement in the shelf score in the group of students who spent more time in a subspecialty. On multivariate analysis, the time in the department/subspecialty was mildly predictive of performance but this effect disappeared when accounting for USMLE performance.

Discussion: There is a small, but measurable, improvement in NBME exam performance in students who spent more time in outside departments and subspecialties during their surgical clerkship. One possible explanation is that these outside rotations may allow for more time to study and therefore influence the exam score. Another possible explanation is USMLE performance was significantly higher in the groups with less general surgery exposure (data not shown). When other factors are considered on multivariate analysis, the primary predictors of NBME performance are surgery clerkship grade, internal medicine clerkship prior to surgery clerkship, and USMLE step 1 performance.

INTRODUCTION

➤ The NBME surgery subject examination is a vignette-based multiple choice examination administered at the conclusion of the surgery clerkship. The exam tests overall knowledge of the clinical specialty and is the most discriminating, objective measure of student performance available for the subject matter.

➤ The primary assumption is that a higher score on the standardized exam equates with a better learning experience and acquisition of knowledge.

➤ Previous studies examining student performance have assumed that the student experiences are homogenous. The differences in student performance have been attributed to innate intelligence, surgical aptitude, or variations in educational format.

➤ Curricular content, test difficulty, clerkship duration and timing may all affect the performance on the NBME exam. Studies examining general vs. subspecialty experience on NBME exam performance have shown mixed results.

➤ We hope to further clarify this issue.

METHODS

➤ Retrospective chart review of all medical students rotating on the surgery clerkship between July 2005-June 2008.

➤ Data points collected include: age, sex, ethnicity, type of surgery rotation (general, subspecialty, other department), time of year taking surgery (1st vs. 2nd half), internal medicine prior to surgery, NBME surgery score, oral exam score, clerkship grade, MCAT/SAT score, preclinical grades (microbiology, general and systemic pathology, and physiology), and choice of surgical vs. nonsurgical specialty

➤ During this time period all students participated in the same standardized didactic lecture series, however the time spent in the department of surgery or on a general surgery rotation varied between four, six, or eight weeks

➤ Rotations outside the department of surgery included: orthopaedics, otolaryngology, neurosurgery, urology, anesthesia/CCM, and ophthalmology

➤ Subspecialty rotations included all outside rotations as well as pediatric surgery, thoracic surgery, vascular surgery, and plastic surgery

➤ The students were grouped by time in the surgery department (4, 6, or 8 weeks) and by time in general surgery vs. subspecialty (4 vs. 6/8 weeks)

➤ Univariate statistical analysis (Wilcoxon rank sum test) was performed to identify variables predictive of higher NBME score

➤ Pearson/Spearman and R-square correlation coefficients were used to identify the most important variables for linear regression analysis

RESULTS

Table 1 Demographic Data by Cohort

Demographic	Department-4 weeks N=89 *	Department-6 weeks N=195	Department-8 weeks N=75	General Surgery 4 weeks N=273	General Surgery 6/8 weeks N=86
Male	55 (61.8%)	85 (43.6%)	35 (46.7%)	137 (50.2%)	38 (44.2%)
Female	34 (38.2%)	110 (56.4%)	40 (53.3%)	136 (49.8%)	48 (55.8%)
Age (years)	23-56 (25.67)	22-38 (25.13)	22-30 (24.9)	22-56 (25.3)	22-30 (24.9)
White	60 (67.4%)	136 (69.7%)	49 (65.3%)	187 (68.5%)	58 (67.4%)
Nonwhite	29 (32.6%)	59 (30.3%)	26 (34.7%)	86 (31.5%)	28 (32.6%)

Table 3 Mean Age and Scores

Demographic/Variable	Mean Value	Standard Deviation
Age Range (years)	22-56	
Age (years)	25.2	2.66
Shelf Score (0-100)	72.46	7.97
Shelf Percentile	72.19	22.65
USMLE Step I	231.82	17.24
SAT	1348	113.52
MCAT	31.16	3.4
Physiology Grade	3.35	0.67
General Pathology Grade	3.30	0.57
Microbiology Grade	3.35	0.59
Systemic Pathology Grade	3.35	1.64
Surgery Clerkship Grade	3.49	0.45

Table 5 Mean Shelf Score/Percentile by Time in Department

	4 weeks	6 weeks	8 weeks	P-value
Shelf Score	73.95	72.12	71.54	0.11
Shelf Percentile	72.5	73.8	67.6	0.13

Table 6 Mean Shelf Score/Percentile by Time in General Surgery

	4 weeks	6/8weeks	P-value
Shelf Score	72.59	72.02	0.0125
Shelf Percentile	70.8	76.6	0.09

Table 2 Demographics: All Students N=359

Demographic	N (Percent)
Male	184 (51.25%)
Female	175 (48.75%)
White	245 (68.25%)
Non-white	114 (31.75%)

Table 4 Predictive Factors on Univariate Analysis and Spearman Correlation

Variables predictive of higher shelf score/percentile	P-Value
Male Sex	0.0125
White	0.0001
Surgery in second half of year	0.03
Internal medicine prior to surgery rotation *	0.0087
Class Rank Upper 1/3	<0.0001
AOA membership	<0.0001
Matched Surgical Specialty	0.0113
Surgery Grade *	<0.0001
USMLE Step 1 *	<0.0001
Preclinical grades	<0.0001

Table 7 Preliminary linear regression analysis model with/without USMLE step 1

	Parameter Estimate	P Value		Parameter Estimate	P Value
Surgery Grade	12.03	<0.0001	Surgery Grade	8.04	<0.0001
Internal Medicine Prior	1.55	0.015	Internal Medicine Prior	1.59	0.0045
Surgery 1 st half of year	-0.37	0.54	Surgery 1 st half of year	-1.14	0.03
Time in Department 6 weeks	-1.85	0.01	USMLE Step 1	0.20	<0.0001
Time in Department 8 weeks	-1.55	0.08	Time in Department 6 weeks	-0.57	0.46
Time in GS 4 weeks	1.85	0.0095	Time in Department 8 weeks	-0.67	0.29
			Time in GS 4 weeks	0.40	0.51

CONCLUSIONS

➤ On univariate analysis, less time on general surgery rotations increased the NBME shelf score by a small but significant amount. Similarly, there was a trend toward improved score as the time spent outside the department increased. This effect was much less profound when accounting for clerkship grade and a prior rotation in internal medicine. On preliminary linear regression modeling, these two variables accounted for 50% of outcome variability. With inclusion of USMLE performance this increased to 63% and the effects of subspecialty and time outside the department lose any significance.

➤ The most powerful predictors of NBME exam performance are internal medicine rotation prior to surgery, clerkship grade, and USMLE step 1 score.

➤ There is no detrimental effect of student exposure to surgical subspecialties or rotations away from departmental faculty on student NBME performance.

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