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AN INSTITUTIONAL RESEARCH WHITE PAPER



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• MEDICAL EDUCATION • THE COMLEX TESTING PROCESS



this paper is available on the Internet at
www.telemmed.okstate.edu/chpr/chprpubs.htm
(Adobe Acrobat Reader is required)

BACKGROUND

The National Board of Osteopathic Medical Examiners (NBOME) initiated its redesigned licensing exam for osteopathic physicians in 1995. The Comprehensive Osteopathic Medical Licensing Exam-USA (COMLEX-USA) Level 3 exam replaced the NBOME step 3 exam. COMLEX-USA Level 2 and Level 1 examinations were then introduced in 1997 and 1998 respectively. See page 4 for the detailed examination construction.

The purpose of these exams is to assure that osteopathic physicians possess the medical knowledge considered essential for osteopathic generalist physicians to practice medicine without supervision.

The program is designed "to reflect the reality of clinical medical practice in which a physician utilizes a broad basic science and medical knowledge base to solve various patient problems."

RESEARCH QUESTION

This paper examines the relationship of several quantitative academic measures to achievement on the COMLEX test. The intent is to evaluate if the COMLEX testing process adequately measures the content of medical school curriculum.

RELEVANT LITERATURE

The conversion to the COMLEX series of tests is a recent event. The NBOME, the American Osteopathic Association and the American Association of Colleges of Osteopathic Medicine each have an interest in learning more about the relationships between academic work and professional skills.

A detailed literature search could find no relevant published data concerning predictors and correlations to the performances of osteopathic physicians on licensing examinations.

Therefore we presume that this study will likely be new information; and that this information should be replicated by several osteopathic schools and those results compared to this analysis.

NOTICE

This study is being submitted to the Journal of the American Osteopathic Association for publication. These data are not available for quotation until/unless published. This analysis is being selectively distributed as a courtesy to stimulate timely issue discussion.

DATA

The data used are from the Oklahoma State University College of Osteopathic Medicine Classes of 1994-2000. The data captured were both continuous and nominal. We did not choose to analyze the data by sub-categories of students as the numbers were too small.

The continuous data independent variables examined against the COMLEX scores were student age, undergraduate GPA, medical school GPA (4.0 scale), and MCAT scores. The nominal data examined was gender.

The medical school grade point averages used for each of the exams were:

COMLEX 1	Second Year Med School GPA
COMLEX 2	Final Med School GPA
COMLEX 3	Final Med School GPA

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Table 1
COMLEX/Medical School GPA Correlations

Class	COMLEX 1 (r/r ²)	COMLEX 2 (r/r ²)	COMLEX 3 (r/r ²)
1994	-	-	.71/.51
1995	-	-	.51/.26
1996	-	-	.58/.34
1997	-	.71/.50	.71/.50
1998	-	.63/.40	-
1999	-	-	-
2000	.80/.65	-	-
Average	.80/.65	.67/.45	.65/.43

All correlations (r) & regression coefficients (r²) are statistically significant at p < .0001. Regression analysis shows that the medical school GPA explains 65% of the variation of the COMLEX 1 scores; 45% of the variation of the COMLEX 2 scores; and 43% of the variation of the COMLEX 3 scores.

Table 2
Estimating COMLEX Scores

The regression formulas below are valid for the OSU College of Osteopathic Medicine. One may assume a specific medical school GPA (MGPA) and calculate an estimated COMLEX score. The estimates will be reasonably close to most actual results for OSU students. The authors would appreciate feedback from other osteopathic schools concerning the local relevancy of these correlations.

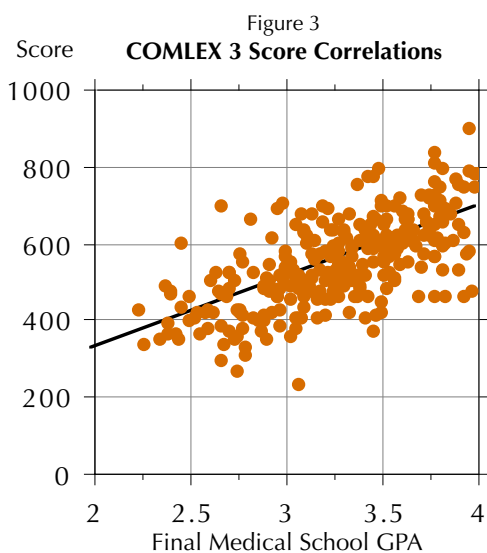
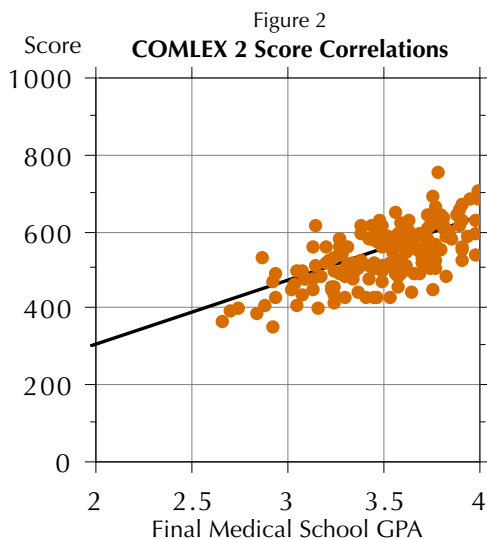
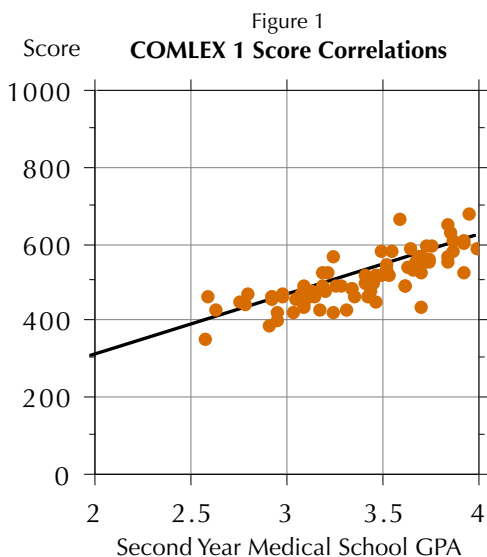
COMLEX 1	[157.142 x MGPA] - 17.6	r=.80; r ² =.65; p<.0001
COMLEX 2	[167.528 x MGPA] - 42.3	r=.67; r ² =.45; p<.0001
COMLEX 3	[183.413 x MGPA] - 44.1	r=.65; r ² =.43; p<.0001

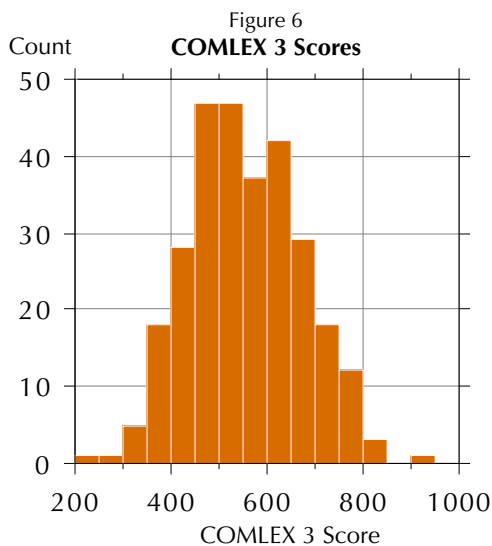
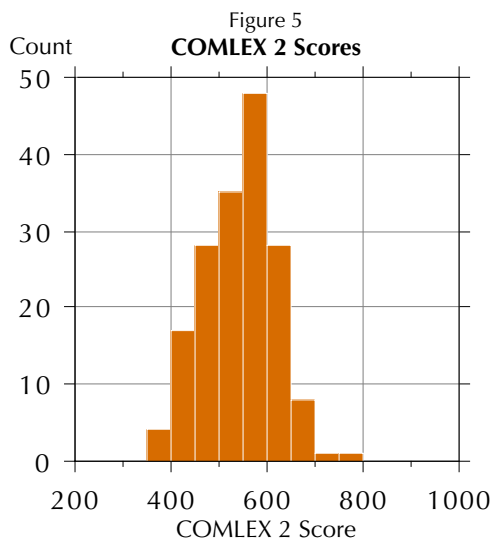
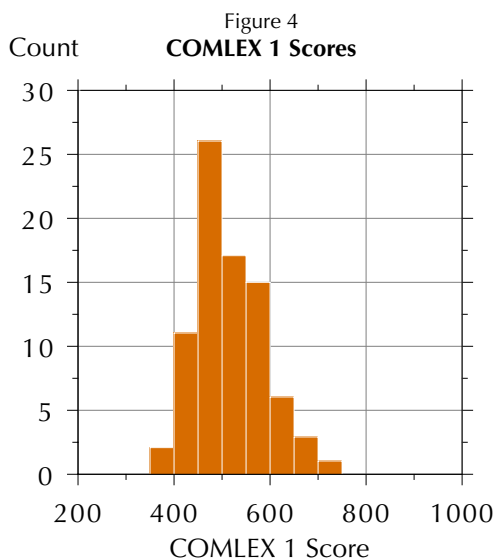
Table 3
Average COMLEX Scores by Class

Class	COMLEX 1 (n=81)	COMLEX 2 (n=170)	COMLEX 3 (n=289)
1994	-	-	503
1995	-	-	544
1996	-	-	577
1997	-	537	582
1998	-	551	-
1999	-	-	-
2000	515	-	-
Average	515	544	553

Table 4
COMLEX Score Percentiles by Class

Class	COMLEX 1	COMLEX 2	COMLEX 3
Highest	742	756	906
90th	606	629	703
75th	564	598	634
Median	503	550	547
25th	466	490	467
10th	432	442	408
Lowest	351	357	238





METHODS

The data were processed and examined using descriptive statistics, stepwise regression and regression analysis. The Statview 4.5 statistical program was used to provide the statistical routines. The descriptive data provided observations concerning class performances; while the regression analysis identified the data significance and strength of the selected independent variables to predict/explain COMLEX scores.

FINDINGS

- The medical school grade point average (MGPA) was a very strong predictor of COMLEX performance for each of the three tests. (Tables 1-2)
- The COMLEX scores of OSU students increased each year for the classes of 1994 through 2000; and increased as the students progressed from COMLEX 1 - 3. (Tables 3-4)
- The MCAT score is also a statistically significant predictor of the COMLEX 2 & 3 scores, but only influences the scores to a very minor degree. The inclusion of the MCAT variable only raises the (r^2) from .67/.45 to .68/.47 for COMLEX 2; and from .65/.43 to .67/.45 for COMLEX 3.
- The undergraduate GPA and student age had no correlation with COMLEX scores.
- The table below shows that the average COMLEX scores for males and females were almost identical.

	Male (n=360)	Female (n=180)	Overall (n=540)
COMLEX 1	518	509	515
COMLEX 2	544	544	544
COMLEX 3	553	552	553

- The OSU study group is a relatively large sample. The data in the OSU study group are for all three COMLEX-USA levels and represent 454 unduplicated medical students in six separate classes over 7 years. The data set represents a total of 540 test scores.

CONCLUSIONS

The medical school GPA is likely the most stable measure of a medical school curriculum. Therefore, it must be concluded that the COMLEX testing process is very successful at measuring medical school curriculum.

The variables of gender, age, MCAT score and undergraduate GPA have little to no statistical effect upon COMLEX scoring.

Medical school admissions are very competitive. Osteopathic medical schools are emphasizing academic quality to increasingly greater degrees. Licensing boards have a keen interest concerning the relationships of academic work and professional skills development. Given these circumstances, we believe that this study should be the first of many that will illuminate the complex relationships within the medical education environment.

Examination Content of COMLEX Testing The National Board of Osteopathic Medical Examiners

source: www.nbome.org

Each test level is constructed in a two-dimensional manner with the same elements common to all three exams (see Table A below). This unique feature in medical licensing exams will allow predictive validity studies from level to level.

The COMLEX-USA testing process involves two full days of testing, with each day divided into two four-hour sessions. Each session consists of approximately 200 exam items, with the topics randomly ordered. Each level is given two times per year. COMLEX Level 1 is given to students who have completed two years of medical school, Level 2 at near completion of four years of medical school and Level 3 during the internship (PGYI) year.

Table A
The COMLEX USA Blueprints

Dimension I				
Clinical Presentation (in percentages)				
Tested Subject	COMLEX	COMLEX	COMLEX	
	Level 1	Level 2	Level 3	
Asymptomatic	13-16	9-12	5-15	
Bleeding	3-5	3-5	2-7	
Cognitive Difficulties	4-6	4-6	3-9	
Consciousness Alterations	2-4	2-4	1-5	
Digestive Difficulties	5-7	5-7	2-8	
Discharge	2-4	2-4	2-8	
Fatigue & Weakness	3-5	3-5	2-7	
Fever & Hypothermia	1-3	3-5	2-7	
Genitourinary Disorders/Issues	6-8	6-8	5-10	
Masses & Edema	4-6	4-6	3-9	
Musculoskeletal Difficulties	8-10	3-5	2-7	
Pain	13-16	13-16	10-20	
Pregnancy/Childbirth/ Post-partum/Neonatal Assessment	3-5	9-12	5-15	
Respiratory Difficulties	6-8	6-8	5-10	
Sensory & CNS Difficulties	3-5	3-5	2-7	
Skin, Nail & Hair Disorders	1-3	2-4	1-5	
Sleep Disturbances	0-2	0-2	1-2	
Substance Abuse	1-3	1-3	1-4	
Trauma	2-4	2-4	1-5	
Dimension 2				
Physician Tasks (in percentages)				
Tested Subject	COMLEX	COMLEX	COMLEX	
	Level 1	Level 2	Level 3	
Health Promotion and Disease Prev	1-5	15-20	15-20	
History & Physical	5-12	35-40	10-15	
Diagnostic Technologies	1-5	15-20	20-25	
Management	3-7	10-17	30-35	
Scientific Understanding Of Mechanisms	75-85	5-8	5-10	
Health Care Delivery	0-1	5-8	5-10	

Level 1

Level 1 is constructed according to the integrated test blue-print shown in Table A (at left, this page). Candidates are expected to demonstrate basic science knowledge relevant to medical problems defined by the Level 1 blueprint. Level 1 emphasizes the medical concepts and principles necessary for understanding the mechanisms of medical problems and disease processes.

Level 1 is a two-day, written multiple-choice examination covering the basic medical sciences of anatomy, behavioral science, biochemistry, microbiology, osteopathic principles, pathology, pharmacology, physiology and other areas relevant to medical problems defined by the Level 1 blueprint. The examination consists of four test books, each given in a four-hour test session, containing questions related to all clinical presentations and disciplines.

Level 2

Level 2 is constructed according to the test blueprint shown in Table A (at left, this page). Candidates are expected to demonstrate clinical concepts and principles involved in all steps of medical problem-solving defined by Dimension II. Level 2 emphasizes the medical concepts and principles necessary for making appropriate medical diagnoses through patient history and physical examination findings.

Level 2 is a two-day, written multiple-choice examination covering the clinical disciplines of community medicine/medical humanities, emergency medicine, internal medicine, obstetrics/gynecology, osteopathic principles, pediatrics, psychiatry, surgery, and other areas necessary to solve medical problems defined by the Level 2 blueprint. The examination consists of four test books, each given in a four-hour test session, containing questions related to all clinical presentations and disciplines.

Level 3

Level 3 is constructed according to the test blueprint shown in Table A (at left, this page). Candidates are expected to demonstrate clinical concepts and principles necessary for solving medical problems as independently practicing osteopathic generalist physicians. Level 3 emphasizes the medical concepts and principles required to make appropriate patient management decisions.

Level 3 is a two-day, written multiple-choice examination covering the clinical disciplines of community medicine/medical humanities, emergency medicine, internal medicine, obstetrics/gynecology, osteopathic principles, pediatrics, psychiatry, surgery, and other areas necessary to solve medical problems defined by the Level 3 blueprint. The examination consists of four test books, each given in a four-hour test session, containing questions related to all clinical presentations and disciplines.