The Social Mission of Medical Education: Ranking the Schools

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Background: The basic purpose of medical schools is to educate physicians to care for the national population. Fulfilling this goal requires an adequate number of primary care physicians, adequate distribution of physicians to underserved areas, and a sufficient number of minority physicians in the workforce.

Objective: To develop a metric called the social mission score to evaluate medical school output in these 3 dimensions.

Design: Secondary analysis of data from the American Medical Association (AMA) Physician Masterfile and of data on race and ethnicity in medical schools from the Association of American Medical Colleges and the American Association of Colleges of Osteopathic Medicine.

Setting: U.S. medical schools.

Participants: 60 043 physicians in active practice who graduated from medical school between 1999 and 2001.

Measurements: The percentage of graduates who practice primary care, work in health professional shortage areas, and are underrepresented minorities, combined into a composite social mission score.

Results: The contribution of medical schools to the social mission of medical education varied substantially. Three historically black colleges had the highest social mission rankings. Public and community-based medical schools had higher social mission scores than private and non–community-based schools. National Institutes of Health funding was inversely associated with social mission scores. Medical schools in the northeastern United States and in more urban areas were less likely to produce primary care physicians and physicians who practice in underserved areas.

Limitations: The AMA Physician Masterfile has limitations, including specialty self-designation by physicians, inconsistencies in reporting work addresses, and delays in information updates. The public good provided by medical schools may include contributions not reflected in the social mission score. The study was not designed to evaluate quality of care provided by medical school graduates.

Conclusion: Medical schools vary substantially in their contribution to the social mission of medical education. School rankings based on the social mission score differ from those that use research funding and subjective assessments of school reputation. These findings suggest that initiatives at the medical school level could increase the proportion of physicians who practice primary care, work in underserved areas, and are underrepresented minorities.

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Medical schools in the United States serve many functions, but one of their most basic purposes is to educate physicians to care for the national population. During the latter half of the 20th century, with federal and state support, medical education expanded to meet population needs (1). However, 3 specific interrelated issues challenged medical educators and policymakers: an insufficient number of primary care physicians, geographic maldistribution of physicians, and the lack of a representative number of racial and ethnic minorities in medical schools and in practice.

As early as the 1950s, commissions concerned with the medical workforce in the United States issued reports that raised these concerns (2–4). These reports helped launch legislation beginning with the Health Professions Educational Assistance Act of 1963 that provided support for expansion of medical education with particular attention to primary care, physician distribution, and educational opportunities for minority medical students. The National Health Service Corps, created in 1970, provided scholarships for students who committed to practice in underserved communities. Of the 28 allopathic medical schools opened with the aid of substantial state and federal support between 1970 and 1982, the

Public medical schools primarily admit students from within their states; therefore, we calculated the ratio of the proportion of underrepresented minorities graduated by the school to the proportion of underrepresented minorities living in the state. For private schools, which admit students from a more national pool, we calculated the ratio of the proportion graduated by the school to the national proportion. We calculated ratios for public and private Puerto Rican schools by using the proportion of underrepresented minorities in Puerto Rico because these schools primarily recruit from and produce physicians who practice in Puerto Rico. To calculate the percentage of state and national underrepresented minorities, we used data from the U.S. Census Bureau.

Three historically black medical schools with a high proportion of graduates who are underrepresented minorities created a significantly skewed distribution. To normalize the skewed distribution, we calculated the standstribution. conawh

Table 1—Continued

School–State (Nation) Ratio of Underrepresented Minorities		Underrepresented Minorities in the School, %	Underrepresented Minorities in the State (Nation), %
Ratio	Standardized Score‡		
2.99	10.78	79.3	26.5
1.31	3.23	19.0	14.5
1.24	2.99	23.7	19.1
0.29	–0.78	8.2	28.7
1.35	3.38	8.1	6.0
0.39	–0.37	7.6	19.5
0.82	1.32	8.0	9.8
0.89	1.58	4.2	4.7
0.75	1.05	21.2	28.3
1.26	3.03	13.8	11.0
0.21	–1.09	9.3	44.7
0.17	–1.24	7.0	41.2
0.54	0.20	14.8	27.7
0.18	–1.19	4.8	26.5
0.33	–0.60	8.8	26.5
0.20	–1.14	5.2	26.5
0.36	–0.51	9.4	26.5
0.37	–0.45	9.8	26.5
0.55	0.24	14.5	26.5
0.40	–0.35	10.5	26.5

Composite Index and Aggregate Analysis

We constructed a composite score by using a simple sum of these 3 standardized measures. We also developed an alternative composite score comprising the sum of each school's within-component ranking on a theoretical scale from 3 (1 1 1) to 434 (141 141 141) (rank-sum approach). We reported results using the composite measure sum ranking because these findings were not very different from those using the rank-sum approach and because the simple sum measure preserves information about the magnitude of differences across schools for each measure.

We also analyzed schools in aggregate by geographic region, size of the metropolitan area of the school's main campus, private or public status, National Institutes of Health (NIH) support (30), allopathic or osteopathic status, and classification as a community-based school by the Association of American Medical Colleges and determined weighted mean scores for each classification (Appendix, available at www.annals.org). Because of the differences in school sizes, the numbers of graduates per school were weighted into the mean value. We obtained regional classifications from the U.S. Census Bureau (31) and county size classifications from the U.S. Department of Agriculture's Rural–Urban Continuum Codes (32). We used analysis-of-variance models to compare the composite scores and the 3 specific scores across different school characteristics.

Role of the Funding Source

This study was conducted as part of the Medical Education Futures Study, which is funded by the Josiah Macy, Jr. Foundation to examine the social mission of medical education during the current period of medical school expansion. The funding source had no role in the study design, data collection, or interpretation of results.

RESULTS

Table 1 shows the 20 schools with the highest and lowest social mission scores and the primary care, HPSA, and underrepresented minority measures on which the schools' composite scores were based. The ranking of all 141 schools is in the Appendix (available at www.annals.org).

Aggregate analysis (Table 2) suggest differences in social mission score and components by geographic region and the size of the metropolitan area in which the schools are located. No region was clearly advantaged in all 3 measures; however, the South, West, and Midwest had positive social mission scores, whereas the Northeast had a negative social mission score. Western schools produced more primary care physicians, and Southern schools produced more physicians who practice in underserved areas. Southern schools also had the largest percentage of underrepresented minorities among their graduates but, after correction for underrepresented minorities in the regional population, had the same relative representation of minorities as Midwestern schools. Schools in progressively smaller metropolitan areas produced increasingly more primary care physicians and physicians who practice in underserved areas but graduated fewer underrepresented minorities.

Compared with allopathic schools, osteopathic schools produced relatively more primary care physicians but obtained fewer underrepresented minorities. Public schools scored higher on the composite social mission score and in all 3 component measures, although the differences between public and private schools were not statistically sig-

Table 2. **Comparison of Social Mission Scores, by Location, School Type, and Funding***

Characteristic	Schools, *n*	Social Mission Score†	Primary Care Physicians		Physicians Practicing in HPSAs		School–State (Nation) Ratio of Underrepresented Minorities		Underrepresented Minority Graduates, %
			Total, %	Standardized Score‡	Total, %	Standardized Score‡	Ratio	Standardized Score‡	
Region§‖									
Midwest	37	0.14	36.0	0.12	25.5	–0.16	0.53	0.18	9.3
Northeast	34	–1.05	31.2	–0.55	23.8	–0.36	0.45	–0.13	11.4
South	49	0.46	35.4	0.03	28.6	0.19	0.54	0.23	14.8
West	18	0.12	38.6	0.49	24.1	–0.32	0.47	–0.04	13.8
P value¶		0.015		<0.001		0.027		0.417	
Rural–urban continuum§‖									
MSA >1 million persons	85	–0.38	33.6	–0.22	24.7	–0.26	0.51	0.10	13.3
MSA, 250 000–1 million persons	34	0.48	37.1	0.28	28.5	0.18	0.49	0.03	10.1
MSA <200 000 persons	15	1.10	38.8	0.51	28.8	0.21	0.58	0.38	8.8
Non-MSA	4	0.57	39.2	0.57	30.0	0.36	0.39	–0.36	6.1
P value¶		0.065		0.006		0.072		0.855	
Community-based (allopathic medical schools only)									
No	107	–0.20	33.4	–0.24	25.7	–0.14	0.53	0.18	13.4
Yes	17	1.47	39.8	0.66	28.4	0.17	0.64	0.64	19.7
P value¶		0.024		0.003		0.335		0.346	
School type									
Allopathic	124	–0.07	33.9	–0.17	25.9	–0.12	0.54	0.21	13.9
Osteopathic	17	0.08	39.9	0.67	26.7	–0.03	0.34	–0.57	8.3
P value¶		0.782		<0.001		0.710		0.029	
Funding									
Private	59	–0.58	32.7	–0.34	25.1	–0.21	0.47	–0.03	13.5
Public	82	0.37	36.3	0.17	26.7	–0.02	0.54	0.22	12.9
P value¶		0.009		0.001		0.244		0.255	
NIH support									
Quartile 1 ($0–$17 million)	36	0.15	38.9	0.53	27.0	0.01	0.39	–0.39	11.1
Quartile 2 ($18–$84 million)	35	0.64	35.1	–0.01	29.2	0.26	0.57	0.39	15.9
Quartile 3 ($85–$244 million)	35	–0.37	34.2	–0.14	24.2	–0.31	0.50	0.08	12.5
Quartile 4 ($246–$897 million)	35	–0.52	31.4	–0.54	24.2	–0.31	0.57	0.32	13.1
P value¶		0.090		<0.001		0.026		0.130	

HPSA = health professional shortage area; MSA = metropolitan statistical area; NIH = National Institutes of Health.
* Social mission scores and percentages and scores of primary care physicians, HPSAs, and underrepresented minorities are averages weighted by school size.
† The sum of the primary care, HPSA, and underrepresented minority standardized scores.
‡ The standardized value calculated for each measure, with a mean value of 0 (SD, 1).
§ These weighted averages exclude Puerto Rican schools.
‖ These data were obtained from the U.S. Census Bureau.
¶ *P* values are obtained from analysis of variance comparing scores within categories.

nificant for the underserved area and underrepresented minority components.

Funding by the NIH was inversely associated with social mission score and with a school's output of primary care physicians and physicians practicing in underserved areas. Community-based schools scored higher than non–community-based schools in the composite social mission score and in all 3 component measures, although the differences between community-based and non–community-based schools were not statistically significant for the underserved area and underrepresented minority components.

School rankings obtained by using the social mission score in a secondary analysis based on the rank-sum approach were strongly correlated with rankings obtained by using the social mission score as a sum of composite score measures ($r = 0.971$). Fifteen of the top-20 schools in the composite-score sum rankings were also ranked among the top-20 schools when the alternative rank-sum scoring method was used. Giving greater weight to individual outliers with our composite measure caused some of these differences. For example, the University of Mississippi ranked 13th on social mission on the basis of composite score measures but 63rd in the alternative rank-sum ranking, because a very high percentage (62.5%) of the school's graduates practice in HPSAs; the school's relatively low percentage of graduates who practice primary care (33.5%) or are underrepresented minorities (school–state ratio,

0.23) contributed to its lower score compared with the sum of each school's within-component ranks.

Discussion

Primary care physician output, practice in underserved areas, and a diverse physician workforce have persistently challenged the U.S. health care system and medical education. This analysis reveals substantial variation in the success of U.S. medical schools in addressing these issues.

Ranking schools is not new. Since 1983, *U.S. News & World Report* has published rankings of colleges and graduate schools (33) that are based on the amount of sponsored research at the schools; student selectivity criteria, such as Medical College Admission Test scores and grade point averages; and subjective assessments made by medical school deans and residency directors (34). In 1995, *U.S. News & World Report* added a primary care rating system that takes into account the percentage of graduates entering primary care residencies. However, their primary care rating continues to include faculty opinion and student-selectivity measures (17). Moreover, this system does not measure the actual number of graduates entering primary care practice after completing their residencies or score the number of graduates who practice in underserved areas or are underrepresented minorities. Because of these differences, our results vary considerably from the *U.S. News & World Report*'s rankings. Our findings suggest numerous areas that are relevant to public policymakers and medical educators as they consider the design of new medical schools and the expansion of current ones.

The 3 historically black colleges and universities with medical schools (Morehouse School of Medicine, Meharry Medical College, and Howard University) score at the top of the social mission rankings. These results are not unexpected, as 70% to 85% of each of these schools' graduating classes were underrepresented minorities compared with only 13.5% in all medical schools during the same period. The higher underrepresented minority scores alone significantly increase these schools' social mission scores. However, all of these schools also score in the top half of the primary care and underserved output measures.

Previous studies have shown that underrepresented minority physicians provide relatively more care to minority and underserved populations compared with nonminority physicians (35, 36). Our findings, in conjunction with these studies, suggest that expansion programs focused on the recruitment and training of underrepresented minority medical students could have disproportionately favorable effects on the geographic misdistribution of physicians and inadequate primary care workforce.

Public schools graduate higher proportions of primary care physicians. Public schools also seem to graduate greater proportions of physicians practicing in underserved areas and of minority physicians than private schools; however, the differences between public and private schools in these 2 components were not statistically significant. These findings indicate that public schools are more responsive to the population-based and distributional physician workforce needs that concern legislators, and suggest that enhanced support for medical education at the state level could address workforce needs more effectively than would investment in private schools.

Furthermore, the higher social mission score of community-based medical schools suggest that a school's explicit commitment to educate physicians who will pursue careers compatible with community needs has long-term effects on the career choices of its graduates. However, the difference between the high proportion of graduates practicing in underserved areas and that of minority physicians at these schools was not statistically significant compared with those of non–community-based colleges, and the successes of Morehouse School of Medicine (1 of the 17 community-based colleges and a clear outlier in at least the underrepresented minority component) may have contributed to the higher social mission score for community-based colleges overall.

The level of NIH support that medical schools received was inversely associated with their output of primary care physicians and physicians practicing in underserved areas. High levels of research funding clearly indicate an institutional commitment to research and probably indicate missions that value technical medicine and specialization rather than training in primary care and practice in underserved areas. Our findings suggest that schools with smaller research portfolios are more likely to focus on training physicians for community and population needs, although schools in the lowest quartile of NIH funding also scored lower for underrepresented minority output than did schools with higher levels of NIH funding. Nevertheless, we propose that educational ranking systems that place significant weight on research funding may confuse discussions of national educational policy by conflating research values with national clinical needs.

Compared with other U.S. regions, the Northeast, with its preponderance of private, traditional, and research-intensive medical schools, had the lowest scores in the primary care and underserved areas components and a distinctly lower social mission score. The size of the metropolitan area in which schools are located also seems to affect the social mission score. For example, medical schools in less urban areas were more likely to produce primary care physicians and physicians practicing in underserved areas. These findings may be particularly useful for individuals or organizations considering building new schools or developing branch campuses of existing schools.

Our findings indicate that osteopathic schools continue to place substantially more graduates into primary care and marginally more graduates into underserved areas, suggesting that osteopathic medicine has continued to be influenced by its traditional focus on primary care and

rural practice (37–39). However, allopathic schools have recruited more underrepresented minorities than osteopathic schools. Osteopathic medicine has been creative in establishing new schools in nontraditional locations, such

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Correction

In the recent article by Mullan and colleagues (1), several institutions were named incorrectly. Morehouse College should be listed as Morehouse School of Medicine. Baylor University should be listed as Baylor College of Medicine. Michigan State University should be listed as Michigan State University College of Human Medicine. University of Medicine and Dentistry of New Jersey should be listed as University of Medicine and Dentistry of New Jersey—NJ. Association of American College of Osteopathic Medicine should be listed as American Association of Colleges of Osteopathic Medicine. University at Albany, State University of New York should be listed as Albany Medical College. Universidad de Puerto Rico en Ponce in Table 1 and Ponce Medical College in Appendixes 4 and 5 should be Ponce School of Medicine.

The online version has been corrected.

Reference

1. Mullan F, Chen C, Petterson S, Kolsky G, Spagnola M. The social mission of medical education: ranking the schools. Ann Intern Med. 2010;152:804-11. [PMID: 20547907]