Predicting Systems-Based Practice Performance: Correlations between Medical School Social Mission Scores and Competency Assessments in Residency

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Questions

Suggested Citation

Background

Medical education plays a central role in shaping the future health care workforce to meet society's needs.[1,2,3,4] Since 2013, a framework of milestones have been used by the Accreditation Council for Graduate Medical Education to evaluate resident and fellow outcomes across medical specialties. They are based on six general competencies: medical knowledge, patient care, interpersonal and communication skills, practice-based learning and improvement, and systems-based practice (SBP). The SBP core competency was developed in recognition of the fact that physicians do not work in siloes and, in order to be effective, must engage with the broader structures that impact health—including health systems but also legal, educational, social service systems, and more. Competency in SBP is defined as understanding the physician's role in complex systems, navigating them for the benefit of patients, and addressing health disparities and upstream factors that impact health.[1] It is comprised of specialty-specific subcompetency milestones like patient safety, system navigation, physician role, and advocacy.[2,5,6] Broadly, the SBP expectations push the profession from the narrow solo practitioner focus to an approach that recognizes the importance of larger structures in achieving optimal health outcomes.[7]

Residents are evaluated by their program leadership every six months on each SBP milestone according to an educational rubric that demonstrates the growing expectation for physicians to competently practice within a larger system. Despite limitations to the SBP milestones, it remains the competency most directly targeted at key topics such as population health, social determinants of health, and health equity. Little is known about what impacts individual residents' performance in SBP, and how to best train them to excel in this important competency. The Social Mission Metrics Initiative (SMMI) developed a self-assessment survey to measure the social mission of health professions schools, including undergraduate medical education programs.[3,4] Social mission is the contribution of a school to enhancing health equity and addressing the health disparities of the society in which it exists through its mission, programs, and the performance of its graduates, faculty, and leadership.[14] Medical schools that have a strong social mission have curricula, policies, and programs that support community partnerships, advocacy, and addressing social determinants of health – all key components of SBP. While many medical schools are increasing their uptake of social mission,[3,4] little is known about how these factors impact graduates applied skills in SBP once they graduate.

Methods

This exploratory study examines whether the social mission-orientation of a medical school predicts its graduates' performance on systems-based practice milestones for Family Medicine. Family Medicine was selected for the specialty's alignment with the SMMI's health equity focus outcome of primary care access, earlier implementation of Milestones 2.0 (effective July 1, 2020) compared with other specialties, and program variation in location and size.

Settings and Participants

Our study was a secondary analysis with an observational study design, with its focus on residents who participated in the ACGME accredited Family Medicine residency-programs. The residents' performances were evaluated by the residency program and submitted to the ACGME

annually. We utilized the residents' performances reported to ACGME in academic years 2020 to 2021. The key independent variable was the social mission orientation of the medical school. For this variable, we used U.S. medical school scores from a 2019 Social Mission Metrics Intiaitive (SMMI) self-assessment. The was a nationally implemented interprofessional self-assessment of social mission using a validated questionnaire.[3,4] Leaders of eighty-three medical schools participated in this self-assessment survey to measure their school's social mission engagement and compare their results with national norms. Survey responses were used to generate numeric scores for 79 indicators (with indicators defined as responses to specific scored questions that indicated the state or level of social mission commitment) across 18 activity areas (curriculum, extracurricular activities, targeted education, global health, curriculum and community needs, community collaboration, school mission, student diversity, faculty diversity, academic leadership diversity, pathway and pipeline programs, student training, faculty training, student-run clinics, student activism, faculty activism, primary and community-based care, and social mission–focused research). Each indicator score was then standardized into a Z score, and summed up to a score with weights for each area. The score for the overall social mission performance was the weighted sum of all the standardized area scores. These standardized area scores as well as overall quartile scores (the sum of all area scores) were used for analysis.

In a secondary analysis, we used the U.S. News and World Report rankings of medical schools on the following four measures as key independent variables: 1) graduates practicing primary care, 2) graduates working in rural areas, 3) graduates who were underrepresented minorities, and 4) graduates working in HPSA. This data set had the benefit of including all medical schools in the country, but it was based on a more limited number of measures than the social mission metrics survey.

Other covariates included individual characteristics of residents and residency-level characteristics of the program that they belonged to, which were available in the ACGME data. The residents' characteristics included age, gender, race/ethnicity, and residency outcomes such as withdrawn, dismissed, extension, and so on. The residency-level characteristics included, but were not limited to, the size of the residency program, the number of core faculty, and the type of sponsoring institution, and accreditation status. We also controlled for the characteristics of medical schools from which the residents graduated, which were available in the SMMI data. The school-level characteristics included whether the school conferred the Doctor of Medicine (MD) degree or the Doctor of Osteopathic Medicine degree, and whether the school was publicly or privately owned.

Outcomes Measured

The key outcome variable of our interest was the residents' SBP performance. To obtain the relevant measures, we used 2020-2021 Family Medicine Milestones data from the ACGME, focusing on one of the six core competencies, SBP and its subcompetencies. Milestones data for

individual residents was submitted to ACGME semiannually by all accredited residency programs. We focused on the SBP Milestones, SBP1, SBP2, SBP3, and SBP4. Residents were rated on a 10-point scale for each of these milestones. We looked at the milestones' scores at during the mid-year and year end time points. Alternatively, we also constructed a binary indicator for whether a resident was above the threshold (mean, median, or other reasonable standard based on the distribution of the SBP scores).

Analysis of the Outcomes

First, we merged the ACGME data with the SMM data by school name. As a preliminary analysis, we explored descriptive statistics of medical schools that responded to the SMMI self-assessment survey, and the residents in the ACGME data. We then conducted univariate analysis to examine the distribution of the outcomes (residents' SBP scores) and that of the independent variables (medical schools' SMM scores) in our analytic sample. We also classified the medical schools into 4 quartile groups based on their SMM scores and conducted a bivariate analysis to identify whether the residents' SBP scores were clustered on different levels of social mission orientation of the medical schools.

Then, our main analysis utilized a Generalized Estimating Equation model. GEE answered the following research question: How does the SBP score of a resident within a residency program change if he/she graduated from a medical school with high SMM versus low SMM? We also conducted a robustness check by using US News Report Rankings as independent variables instead of SMM Scores in the same models described above, in order to extend our analysis to a wider range of medical schools that hadn't participated in the SMM survey.

All analyses were performed using R and STATA Version 16. The George Washington University Institutional Review Board approved the study (NCR224106 Exemption).

Results

Our analytic sample consists of the total 8,601 observations from ACGME data that are matched with 74 medical schools in SMM survey data (2020-2021 Mid-year survey: n = 4,338; 2020-2021 Year-end survey: n = 4,263). Nine medical schools from the original SMMI data were excluded: seven medical schools were not included in the ACGME data, and the other two schools had no overall and area-level SMM scores. The number of residents who had ACGME data and went to a school that participated in the 2019 SMMI survey was 4,216. The residents in our analytic sample represent 607 residency programs across the 50 states and Puerto Rico.

Among the total 74 medical schools, 54 conferred MD degrees, and 20 provided DO degrees. In terms of the ownership type, 33 schools were privately owned whereas 41 were public schools. The summary statistics of the overall SMM scores and the standardized area scores are shown in Table 1. (The summary statistics for the total 83 schools in the SMM survey are shown in Appendix Table 1 to Table 7.)

Table 1. Summary Statistics of Overall Social Mission Metrics Score and Standardized Scores for Areas of Interest

	N	Mean	S.D.	Min	25p	Median	75p	Max
Overall weighted score	74	15.02	19.18	-34.75	.78	12.87	24.94	79.12
Area 1 (Curriculum)	74	.2	.82	-2.24	-.29	.23	1.06	1.26
Area 5 (School Mission)	74	.22	.98	-1.2	-.46	.21	.7	2.6
Area 6 (Curriculum with Community Needs)	74	.27	.97	-1.12	-.42	.28	.98	1.68
Area 14 (Student-Run Clinics)	74	.38	1.13	-1.47	-.43	-.1	.94	2.54
Area 15 (Student activism)	74	.77	.76	-1.63	.43	.87	1.33	1.7
Area 16 (Faculty activism)	74	-.03	1.03	-1.76	-.98	.07	.79	2.31

We also explored the summary statistics for each of the system-based practice milestone scores of the residents in our analytic sample from each time period included. The results from the year-end report tend to be higher than those from the mid-year report on average in general.

	N	Mean	S.D.	Min	25p	Median	75p	Max
SBP 1 (Patient Safety and Quality Improvement)								
- 2020-2021 Mid-year	4,338	3.77	2.08	0	2	4	5	9
- 2020-2021 Year-end	4,263	4.67	1.99	0	3	4	6	9
SBP 2 (System Navigation for Patient-Centered Care)								
- 2020-2021 Mid-year	4,338	4.07	2.02	0	2	4	6	9
- 2020-2021 Year-end	4,263	4.95	1.88	0	3	5	7	9
SBP 3 (Physician Role in Health Care Systems)								
- 2020-2021 Mid-year	4,338	3.79	2.05	0	2	4	5	9
- 2020-2021 Year-end	4,263	4.7	1.95	0	3	5	6	9
SBP 4 (Advocacy)								
- 2020-2021 Mid-year	4,338	3.83	1.92	0	3	4	5	9
- 2020-2021 Year-end	4,263	4.66	1.84	0	3	5	6	9

For each round of report, we did exploratory analyses on the relationship between the dependent variable, each SBP score, and the key independent variables, SMM scores. First, we conducted binary analyses on each of the SBP scores and the overall scores, but no statistically

significant relationship was found at the 5 percent significance level. From a naïve multivariate regression of each SBP score on the 6 standardized area scores, we found that the area 16 (Faculty Activisim) score was consistently associated with SBP 1 and SBP 2 scores and that the area 1 (Curriculum) score was consistently associated with SBP 4 score, both at the 5 percent significance level.

We also compared the mean of each system-based practice milestones between the US schools who had participated in the SMM survey and those who had not, and found that there was no statistically significant difference between two groups.

Discussion

SBP milestones may not be sufficiently sensitive to measure differences in performance due to limitations in objective data to assess performance.[7] Many scholars have started to identify additional limitations to the SBP competency. For example, they may fall short of addressing the systemic and pervasive social and structural forces to achieving health equity.[1,8] While the US works to bend the cost curve for high-value, cost-conscious care by training residents to be resource stewards, it may worsen inequities for marginalized racial and ethnic groups if the social and structural contexts affecting health are not taught.[1,9] To avert further inequities, the SBP competency may need to change and evolve to better prepare residents for unsupervised practice.[1,10]

Scholars offer opportunities for reconsidering systems-based practice for advancing health equity. Some advocate for a new competency with 3 subcompetency milestones—structural competency (knowledge), structural action (skills), and social responsibility (attitudes)—to improve the recruitment and work satisfaction of trainees from minority groups underrepresented in medicine. This new competency includes topics such as racism, structural and cultural humility, social and structural determinants of health, and moral injury, among others.[1] With the ACGME's residency program requirement to address diversity, equity, and inclusion (DEI), the proposed DEI framework developed by the Association of Family Medicine Residency Directors' Diversity and Health Equity Task Force could also be considered for adoption into SBP. The DEI framework assesses residents' ability to provide care that acknowledges bias, SDOH, cultural humility, and health equity advocacy.[11] A recent study also suggests examining the educational setting and learning environments for determining milestones levels.[12]

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