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Measuring Value in Internal Medicine Residency Training Hospitals Using Publicly Reported Measures

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Abstract

Graduate medical education (GME) lacks measures of resident preparation for high-quality, cost-conscious practice. The authors used publicly reported teaching hospital value measures to compare internal medicine residency programs on high-value care training and to validate these measures against program director perceptions of value. Program-level value training scores were constructed using Centers for Medicare & Medicaid Services Value-Based Purchasing (VBP) Program hospital quality and cost-efficiency data. Correlations with Association of Program Directors in Internal Medicine Annual Survey high-value care training measures were examined using logistic regression. For every point increase in program-level VBP score, residency directors were more likely to agree that GME programs have a responsibility to contain health care costs (adjusted odds ratio [aOR] 1.18, $P = .04$), their faculty model high-value care (aOR 1.07, $P = .03$), and residents are prepared to make high-value medical decisions (aOR 1.07, $P = .09$). Publicly reported clinical data offer valid measures of GME value training.

Keywords

value, quality, cost-effectiveness, graduate medical education

Graduate medical education (GME) programs in the United States face increasing pressure to train physicians who deliver high-value clinical care, defined by high quality and cost-efficiency. If GME does not achieve this goal, the Institute of Medicine has cautioned that its funding and public trust could erode.[1] Moreover, the Medicare Payment Advisory Commission and others have recommended not only increasing GME training in quality, cost-efficient care but also reallocating GME funding to incentivize programs to prepare residents who practice high-value care.[1-6]

These reforms will be challenging unless GME programs have established approaches to measure value training, defined by how programs perform in preparing residents to practice high-value care. Such measurement could help GME programs establish value training benchmarks, identify deficits, and improve through increased resident exposure to high-value clinical settings or targeted value curricula.[7,8] Others outside GME also could benefit from publicly available value training measures. Medical students applying for residency, for instance, could discern which programs immerse them in high-value care settings to prepare them for modern practice, and employers hiring graduating residents would understand the readiness of prospective employees for high-value care delivery.

Essential components of any residency training include clinical experiences and exposures, program director and faculty models, and formal curricula, and each of these components can be leveraged to prepare trainees for high-value practice. This article presents the study team's conceptual model for how these factors contribute to value training in Figure 1.

Although didactic curricula on value are increasingly common,[9] they represent only a small fraction of resident training compared to time spent learning through clinical experiences. Measures of GME value training that gauge clinical exposures and experiences could therefore reflect value training with greater fidelity than measures of formal didactics. Such clinical value measures would reflect not only the learning environment but also upstream institutional value-based care culture[10] while predicting

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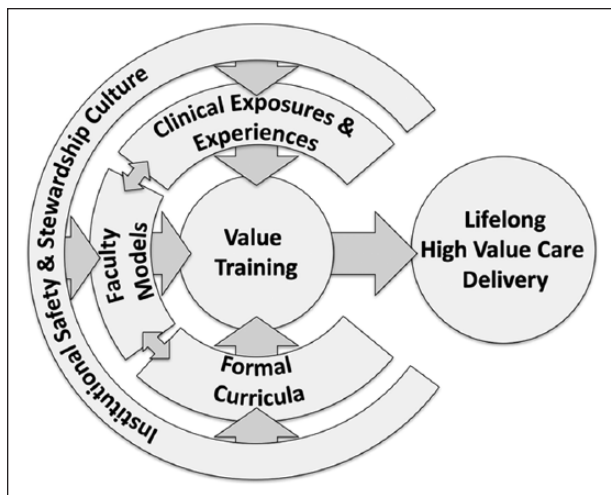Email: Aschickedanz@mednet.ucla.edu

Figure 1. Conceptual model of value training at the residency program level.
The model depicts the relationships between clinical care value exposures and experiences, faculty models, and curricula in the context of institutional value culture that produce resident value training and high-value practice.

the downstream effect of value training: high-value care delivery. Clinical quality and cost data measure the training settings that residents are immersed in, contribute to, and learn from. Therefore, they may be useful measures of value training consistent with calls for reform of GME aligned with standards of a high-performance health care system.[1-3]

Two existing measures of value training using clinical data focus on a few care quality or utilization metrics at the end of life at university-based hospitals.[11,12] However, neither has been used to assess GME programs beyond the individual university hospital, directly incorporated cost metrics, nor included comprehensive sets of quality indicators. Publicly reported teaching hospital quality and cost measures could fill this gap, especially in internal medicine (IM) where residents spend the majority of their training in hospitals developing knowledge, skills, attitudes, and practices that have been shown to influence their patient care quality, costs, and overall value outcomes far into their postgraduate careers.[13-18] The Centers for Medicare & Medicaid Services (CMS) Hospital Value-Based Purchasing (VBP) program total performance score, a publicly reported aggregate measure incorporating component domains of hospital process of care, patient experience, clinical outcomes, and cost-efficiency, is a well-established measure that could be used to compare clinical value training across GME programs. This VBP score has been used widely to adjust reimbursement for roughly 3000 hospitals in CMS' VBP program,[19] including academic teaching hospitals nationwide. Although VBP scores do not measure IM resident care alone, VBP component measures predict IM inpatient care quality outcomes[20] and overall VBP scores correlate with IM physicians' assessments of value-based care at their institutions.[10]

The study team developed IM GME programs' composite value training scores based on CMS VBP measures of their affiliated teaching hospitals to compare differences in composite and component VBP measures, examined hospital- and program-level characteristics associated with higher scores, and cross-validated the VBP measures against program director assessments of value training.

Methods

Data Sources

Hospital data from the CMS Hospital VBP Program released in fiscal year 2015 (2011-2014 claims) were used. The VBP data include quality measures in 3 domains (ie, process of care, patient satisfaction, outcomes) and 1 cost-efficiency domain measuring Medicare spending per beneficiary (MSPB) from which CMS constructs a composite value measure as an adjustment factor for hospital reimbursement.[21] These data were linked to the Medicare Impact Files for fiscal year 2014, which also contained hospital characteristics including bed number, nurse-to-bed ratio, region, ownership, urbanicity, case mix, and Disproportionate Share Hospital (DSH) Index.

Data from the 2012 Association of Program Directors in Internal Medicine (APDIM) annual survey[22] were collected to cross-validate the composite program-level VBP scores against concurrent program-level assessments of value training and understand the extent to which these clinical and educational measures align. The 2012 APDIM survey contacted 96% of all IM residency programs accredited by the Accreditation Council for Graduate Medical Education and collected responses via email and hyperlink from 295 programs for an overall response rate of 76% (77% in the sample).[22]

Teaching Hospital Sample

The study sample included 262 teaching hospitals from the 100 top IM residency programs ranked by *US News and World Report* in 2014.[23] This approach was chosen to assure that the sample focused on the best programs based on academic standards and board exam pass rates (which correlate with VBP score) so that program-level differences in clinical quality and cost-effectiveness were less likely to be attributable to the adequacy of the teaching or the aptitude of the learners. This also allowed for comparisons of VBP scores against conventional program rankings. Teaching hospitals were included in the analyses if they met the criteria for the hospital VBP program,

meaning they were acute care, general medical, or surgical hospitals paid under the Inpatient Prospective Payment System (IPPS), reported data from at least 100 Hospital Consumer Assessment of Healthcare Providers and Systems surveys, and reported data for at least 4 of the 12 clinical process measures with at least 10 eligible cases.[21] This removed from the sample 5 Maryland hospitals not paid under the IPPS[20] and 68 Veterans Affairs (VA) hospitals that are not Medicare hospitals and do not publicly report through the VBP program, as well as 1 hospital excluded from the fiscal year 2015 VBP program while on probation by CMS. Thirty teaching hospitals were excluded because residents trained there fewer than 2 months during their 3 years of residency, leaving a final sample of 158 hospitals.

Value Training Measures

Fiscal year 2015 CMS VBP total performance scores (TPS) of teaching hospitals were employed as the primary measure of value training because they reflect clinical exposures and experiences in the inpatient setting where IM residents spend most of their training time and adopt lasting practice patterns.[13,17] CMS calculates this VBP TPS as a composite of 4 domains (Table 1): clinical processes of care (12 component metrics, 20% of the TPS), patient satisfaction (8 components, 30% of TPS), patient outcomes including mortality and complications (5 components, 30% of TPS), and cost-efficiency defined by MSPB (20% of TPS).[21] The MSPB cost-efficiency measure assesses Medicare Part A and Part B payments received during episodes of care, which are price standardized and risk adjusted. Quality domain component measures at the patient level that roll up into the hospital-level VBP TPS are adjusted by CMS for age, sex, and severity of illness, but not race/ethnicity or socioeconomic status because of methodological challenges and the intent to hold all hospitals to the same standard, despite calls for such social risk adjustment.[24]

For each IM residency program, the study team created a program-level VBP score as the weighted average of its affiliated teaching hospitals' VBP TPS values according to the proportion of all months of training residents spend at each hospital, as reported by program directors and publicly available through the Doximity residency navigator database (Doximity Residency Navigator, San Francisco, California, 2016; https://residency.doximity.com). Similar program-level scores were constructed for each domain of the VBP TPS, along with a composite program-level quality score calculated as the overall VBP TPS minus the cost-efficiency domain.

Through the 2012 APDIM survey, program directors responded to the following prompts on a dichotomized 5-point Likert-type scale (*strongly disagree* to *strongly agree*): (1) "GME has a responsibility to curtail the rising cost of health care," (2) "The majority of faculty who work with residents in our program consistently model cost-conscious care," and (3) "Residents in our program are prepared to incorporate the value and costs of care into consideration when making medical decisions." These program director responses constitute value training measures the team used to cross-validate the program-level VBP measure. The APDIM survey also collected program characteristics, including number of residency positions filled, census region, faculty number and proportion volunteer, and number and type of teaching sites (ie, safety net, university, VA/government affiliated).

Analyses

Teaching hospital-level and program-level quality, cost-efficiency, and overall composite VBP scores were compared across the entire sample in rank order and by hospital or program characteristics using descriptive analyses of means or proportions, Student t tests, and χ^2 tests. Because safety net hospitals have been shown to perform more poorly on patient experience scores,[25] the study team compared VBP scores for programs with and without safety net hospitals (defined by DSH index >0.5).

Logistic regression was used to predict odds ratios of program director agreement with the APDIM survey prompts using program-level VBP scores, adjusting for program characteristics of size, region, faculty makeup, and teaching site count. In sensitivity analyses, additional variables added individually to the logistic models probed whether factors related to known limitations of the VBP score would affect their association with the APDIM survey measures of value training. These additional variables included program-level weighted-average teaching hospital DSH index to adjust for social risk of the patient population served,[26] and hospital-census to program-size ratio to account for the proportion of discharges not cared for by residents, as well as proportions of the residency class who subspecialize or pass their board certification exam. Bivariate Spearman and linear correlation coefficients were calculated between program rank based on VBP scores and *US News* rankings and board certification rates. Analyses were performed using STATA 14.1 (StataCorp LLC, College Station, Texas).

Results

Value Training Measure: Hospital- and Program-Level VBP Program Scores

The 100 IM GME programs included in the sample were affiliated with 158 teaching hospitals and had an average of 103 residents. Compared to national averages, teaching hospitals affiliated with programs in the sample had worse VBP total performance scores (training hospitals' average

Table 1. Centers for Medicare & Medicaid Services Value-Based Purchasing Total Performance Score Component Measures of Quality and Cost-Efficiency.

Clinical Process of Care (Quality)	Patient Satisfaction (Quality)	Patient Outcomes (Quality)	Cost-Efficiency
Fibrinolytic therapy received within 30 minutes of hospital arrival[a]	Nurse communication	Acute myocardial infarction 30-day mortality rate	Medicare payment per beneficiary
Primary PCI received within 30 minutes of hospital arrival	Doctor communication	Heart failure 30-day mortality rate	
Discharge instructions	Hospital staff responsiveness	Pneumonia 30-day mortality rate	
Blood cultures performed in the ED prior to initial antibiotic received in hospital	Pain management	Patient safety for selected indicators (composite of pressure ulcer rate, iatrogenic pneumothorax rate, central venous catheter-related bloodstream infection rate, postoperative hip fracture rate, postoperative pulmonary embolism or deep vein thrombosis rate, postoperative sepsis rate, postoperative wound dehiscence rate, accidental puncture or laceration rate)	
Initial antibiotic selection for CAP in immunocompetent patient[a]	Medicine communication	Central line–associated bloodstream infection	
Prophylactic antibiotic received within 1 hour prior to surgical outcome	Hospital cleanliness and quietness		
Prophylactic antibiotic selection for surgical patient	Discharge information		
Prophylactic antibiotics discontinued within 24 hours of surgery	Overall hospital rating		
Cardiac surgery patients with controlled 6 AM postoperative serum glucose			
Postoperative urinary catheter removal on postoperative day 1 or 2			
Surgery patients on a beta-blocker prior to arrival who received a beta-blocker during the perioperative period			
Surgery patients who received appropriate venous thromboembolism prophylaxis within 24 hours			

Abbreviations: CAP, community-acquired pneumonia; ED, emergency department; PCI, percutaneous coronary intervention.
[a]Centers for Medicare & Medicaid Services did not have data from providers on these measures to include in 2015 scoring (15).

score 38.9 [SD 10.3] vs national average 41.7 [SD 12.6], $P = .002$; all other teaching hospitals average 37.9 [SD 11.2], $P = .3$; all nonteaching hospitals average 42.6 [SD 12.7], $P = .0004$), cost-efficiency (2.9 [SD 4.3] vs national average 4.6 [SD 6.2], $P < .001$), and patient satisfaction (10.7 [SD 5.2] vs national average 13.7 [SD 8.6], $P < .001$). The teaching hospitals' scores did not differ from average national process of care scores and patient outcome scores.[27]

Program-level VBP total performance scores, calculated as the weighted average of their affiliated teaching hospital scores (Table 2), showed considerable variation in quality and cost-efficiency scores across programs. Figure 2 displays GME program VBP cost-efficiency and composite quality (composite patient satisfaction, process, and outcome) domain scores. Within-program cost-efficiency and composite quality scores were not correlated.

Table 2. Comparisons of Centers for Medicare & Medicaid Services Value-Based Purchasing (Fiscal Year 2015) Program Scores and Characteristics of the *US News and World Report* Top 100 Internal Medicine Residency Training Programs and Their Affiliated Teaching Hospitals.

Characteristics	Teaching Hospital Overall Sample, N (%) or Mean (SD)	Hospitals of Programs With Top 20 VBP Scores, N (%) or Mean (SD)	Hospitals of Programs with the Bottom 20 VBP Scores, N (%) or Mean (SD)	P Value; Hospitals From Top 20 Versus Bottom 20 VBP Programs	Program Overall Sample Weighted Mean (SD)	Top 20 VBP Score Programs Weighted Mean (SD)	Bottom 20 VBP Score Programs Weighted Mean (SD)	P Value; Top 20 Versus Bottom 20 VBP Programs
Hospital VBP total performance score (sum all domains)	38.9 (10.3)	48.2 (6.3)	35.5 (8.4)	<.001	37.8 (9.1)	50.5 (5.0)	26.3 (3.0)	<.001
Patient satisfaction score	10.7 (5.2)	15.9 (4.9)	9.1 (4.8)	<.001	10.2 (5.0)	15.7 (5.6)	6.3 (2.2)	<.001
Process of care score	11.1 (3.3)	12.9 (2.8)	9.8 (3.1)	<.001	11.0 (3.1)	12.6 (2.7)	8.9 (2.5)	.001
Patient outcome score	14.3 (6.2)	15.9 (5.8)	11.0 (6.3)	.045	14.2 (5.4)	18.1 (4.7)	9.1 (3.6)	<.001
Medicare spending per beneficiary score	2.9 (4.3)	3.4 (4.5)	2.1 (4.1)	.23	2.5 (3.2)	4.1 (4.3)	1.9 (2.1)	.043
Bed size census to program size ratio	522 (308)	564 (412)	485 (269)	.25	—	—	—	.31
Ownership	—				—	—	—	—
For profit	10 (6.3)	2 (6.9)	2 (6.25)	.92	—	—	—	—
Nonprofit—Private	74 (46.8)	15 (51.7)	12 (37.5)	.26	—	—	—	—
Nonprofit—Other	32 (20.3)	7 (24.1)	9 (28.1)	.72	—	—	—	—
Public/municipal	42 (26.6)	5 (17.3)	9 (28.1)	.31	—	—	—	—
Region					—	—	—	—
Northeast	43 (27.2)	8 (27.6)	10 (31.3)	.75	—	—	—	—
Southeast	32 (20.3)	10 (34.5)	5 (15.6)	.09	—	—	—	—
Central	36 (22.8)	6 (20.7)	7 (21.9)	.91	—	—	—	—
South	10 (6.3)	0 (0.0)	4 (12.5)	.05	—	—	—	—
West	37 (23.4)	5 (17.2)	6 (18.8)	.88	—	—	—	—
Urban rural status					—	—	—	—
Large urban	130 (82.3)	24 (82.8)	27 (84.4)	.87	—	—	—	—
Other urban	25 (15.8)	5 (17.2)	5 (15.6)	.87	—	—	—	—
Rural	3 (0.02)	0 (0.0)	0 (0.0)	—	—	—	—	—
DSH index	37.6 (19.5)	28.3 (15.4)	39.2 (19.2)	.020	—	—	—	—
Case-mix index	1.8 (0.3)	1.9 (0.4)	1.8 (0.3)	.042	—	—	—	—
Nurse–bed ratio	1.8 (0.8)	1.9 (0.8)	1.8 (0.7)	.91	—	—	—	—

Abbreviations: DSH, disproportionate share hospital; VBP, value-based purchasing.
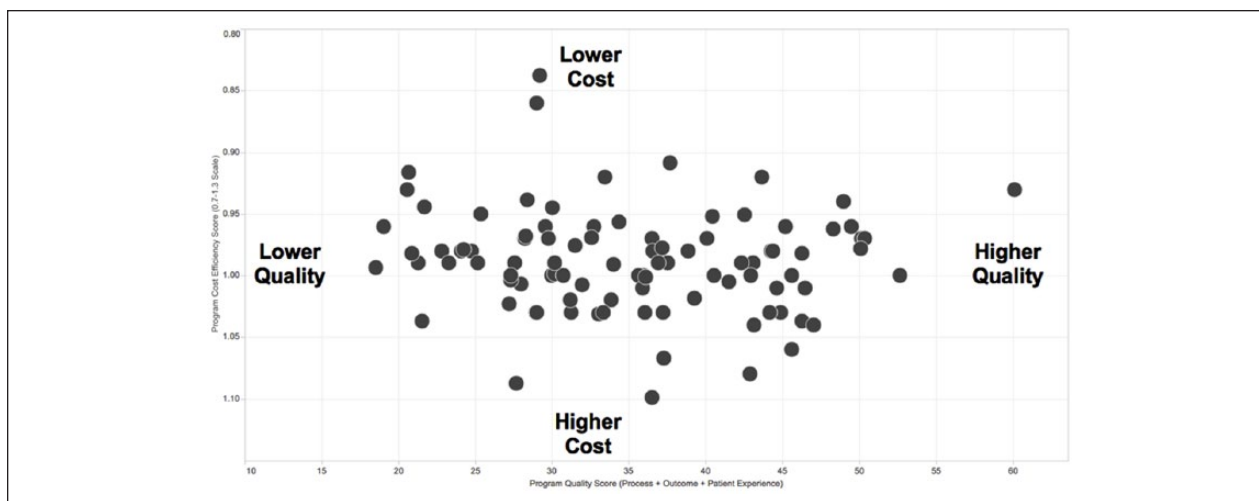
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Figure 2. Internal medicine residency program reaching hospital quality and cost-efficiency.
Program Quality and Cost Efficiency Scores measured using Centers for Medicare & Medicaid Services (CMS) inpatient Value Based Purchasing (VBP) quality and cost component measures. Program Cost Efficiency Score is calculated as the Medicare Part A and Part B hospital payments for average price-standardized and clinically risk-adjusted spending-per-beneficiary divided by expected hospital payments, as reported by CMS, aggregated as a weighted average across each residency program's teaching hospitals according to proportion of time the typical resident spends at each hospital over 3 years of residency training. Program Quality Score is a weighted average of hospital clinical processes of care (25% of Program Quality Score), patient satisfaction (37.5%), and patient outcomes (37.5%) for each teaching hospital, as reported by CMS, aggregated as a weighted average across each residency program's teaching hospitals according to proportion of time the typical resident spends at each hospital over 3 years of residency training.

Differences Between Programs by VBP Program Scores

Program-level VBP TPS, patient satisfaction, process of care, patient outcome, and cost-efficiency domain scores were higher among the top versus and bottom 20 ranked programs (Tables 2 and 3). The top 20 performing programs on VBP TPS were affiliated with hospitals that had a higher average case mix index ($P = .04$), were more often from the South ($P = .05$), and were less likely to be safety net hospitals based on average DSH Index ($P = .02$), compared to hospitals affiliated with programs with the lowest 20 VBP TPS values. A linear correlation was found between program VBP score and board exam pass rates (linear regression coefficient 0.0014 [95% confidence interval (CI) 0.0004-0.0024], $P = .006$) and only a weakly positive correlation was found with *US News and World Report* rankings (Spearman correlation coefficient 0.27, $P = .008$).

Correlations of VBP Scores With Program Director Perceptions of Value Training

In all, 88% of program directors agreed or strongly agreed that GME had a responsibility to help contain health care costs while only 36% (n = 27) agreed or strongly agreed that faculty in their program modeled high-value care. Seventy-four percent of programs had high-value care curricula in place (20%, n = 16) or in

development (53%, n = 41). These factors correlated with program director agreement (61%, n = 46) that their residents were at least somewhat prepared to incorporate value and cost into their medical decisions.

A 1-point increase in overall program-level VBP TPS was associated with a 1.18-fold increase in odds of program director agreement that GME programs had a responsibility to help contain costs (VBP TPS [adjusted odds ratio] aOR 1.18 [95% CI 1.002-1.43], $P = .04$) and a 1.07-fold increase in odds of agreement that faculty model high-value care (aOR 1.07 [95% CI 1.006-1.14], $P = .03$), controlling for program size, region, and faculty and teaching site characteristics. Though it did not reach statistical significance, every point increase in program-level VBP TPS was associated with a 1.07-fold increase in odds of agreement that residents were prepared to incorporate value in their medical decisions (aOR 1.07 [95% CI 0.99-1.15], $P = .09$). These effect sizes remained similar even after including the program-level weighted average DSH index, teaching hospital-census to residency-size ratio, subspecialization rate, or board certification rate in sensitivity analyses. Programs with the top 20 VBP TPS values were more likely to be adopters of high-value care curricula compared to the bottom 20 programs (88% vs 65%, n = 15 of 17 vs n = 13 of 20), but VBP TPS did not significantly correlate with cost-conscious care curriculum adoption in adjusted regression analyses.

Table 3. Quality and Cost-Efficiency Assessment of Residency Programs With the Top 20 Weighted Centers for Medicare & Medicaid Services Hospital Value-Based Purchasing Program Overall Scores (Listed in Alphabetic Order).

Top 20 Residency Programs (Listed Alphabetically)					Residency Programs' Affiliated Training Hospitals	
	Quality Measures Rankings			Cost Measure Ranking		Individual Hospital VBP Ranking
Residency Program Name	Patient Satisfaction	Clinical Process of Care	Patient Outcomes	Medicare Payment per Beneficiary	Hospital Name	
University of Alabama Medical Center	4	16	34	18	University of Alabama Hospital	12
Beth Israel Deaconess Medical Center	40	8	15	37	Beth Israel Deaconess Medical Center	39
Cedars-Sinai Medical Center	32	42	5	37	Cedars-Sinai Medical Center	30
Cleveland Clinic Florida	13	57	2	37	Cleveland Clinic Hospital	15
Cleveland Clinic Foundation in OH	7	92	19	29	Cleveland Clinic	33
Duke University	20	5	14	29	Duke University Hospital	9
					Duke Regional Hospital	74
Eastern Virginia Medical School	5	11	56	31	Sentara Norfolk General Hospital	23
					Sentara Leigh Hospital	47
Emory University	12	52	39	12	Grady Memorial Hospital	11
					Emory University Hospital	76
					Emory University Hospital Midtown	41
Massachusetts General Hospital	11	47	26	37	Massachusetts General Hospital	36
					Newton-Wellesley Hospital	24
Mayo Clinical College of Medicine Arizona	1	19	13	6	Mayo Clinic Hospital	4
Mayo Clinic College of Medicine Jacksonville	2	58	29	29	Mayo Clinic	16
Mayo Clinic College of Medicine Rochester	3	35	40	11	Mayo Clinic Hospital Rochester	10
New York Presbyterian Hospital Columbia Campus and New York Presbyterian Hospital Cornell Campus	71	23	3	18	New York-Presbyterian Hospital	22
Olive View/UCLA Medical Center	70	76	48	1	LAC/Olive View-UCLA Medical Center	26
					Ronald Reagan UCLA Medical Center	82
Oregon Health and Science University	24	34	24	14	OHSU Hospital and Clinics	56
Rush University Medical Center	16	15	16	27	Rush University Medical Center	13
University of Kansas School of Medicine	9	26	59	29	University of Kansas Hospital	34
University of North Carolina Hospitals	6	4	49	19	University of North Carolina Hospital	14
					Wakemed, Raleigh Campus	84
University of Rochester	42	2	77	4	Strong Memorial Hospital	28
					Highland Hospital	20
UPMC Medical Education	46	3	12	37	UPMC Presbyterian Shadyside	32

VBP, value-based purchasing.

Differences by Safety Net Hospital and VA Teaching Hospital Affiliation

The 34 programs affiliated with safety net hospital teaching sites had a lower average VBP TPS (33.9 [SD 8.0] vs 40.0 [SD 9.1], $P = .002$) driven by lower average patient experience and patient outcome domain scores despite superior cost-efficiency. A majority (58.3%) of programs had VA hospital training sites, but residents in the overall sample only spent 13.5% of their time in training at VA sites, on average. Programs with and without VA sites did not differ significantly in their VBP scores or APDIM survey value training measures.

Discussion

This study used publicly available CMS measures of teaching hospital quality and cost-efficiency to measure value training and compare clinical experiences and exposures to high-value care across IM residency programs. Overall, teaching hospitals affiliated with the most respected residency programs performed below national averages in terms of composite clinical value scores, though there was wide variation in both cost-efficiency and quality. Although many GME programs excelled in specific areas of high-value care, very few are top performers across the board in process, satisfaction, outcome, and cost-efficiency. In the sample of GME programs, higher likelihood of program director agreement that cost-consciousness was a responsibility of residency training, that faculty modeled high-value care, and that residents were prepared to incorporate value into medical decisions all showed relationships with VBP TPS measures. Affiliated safety net teaching hospitals predicted poorer program rankings in these analyses, as did region and case-mix index, consistent with prior literature.[25,28,29] These results suggest that IM residents' exposure to high-value care in teaching hospitals may be quantified using publicly reported quality and cost-efficiency data.

Understanding the relative value training strengths of GME programs provides transparency and could facilitate improvements in training at a time when reducing health care costs and improving quality are a national priority. This information can help individual GME programs assess their need to improve value-based training and better prepare physicians for practice in the increasingly value-driven health care system. Programs that identify their teaching hospitals as poor performers in cost-efficiency, for example, could supplement their curricula with a specific focus on health care cost awareness or create new rotations at hospitals with high VBP cost-efficiency scores. Best practices could be identified from top-performing programs and be applied to lower performers to advance value-based education more quickly and uniformly.

Limitations

Though measures of clinical cost and quality in VBP have the advantages of being well-established and familiar because of their use for reimbursement, there are important shortcomings of their use that the study team attempted to address in this study. CMS's risk adjustment precludes adjustment based on race, ethnicity, or socioeconomic status data of either patients or hospital service areas, and some component measures included in the value-based payment score calculation are affected by care from clinical teams that IM residents have limited participation on. Either of these factors could lead to bias or imprecision in using the VBP TPS as a measure of value training. However, the team found that the size of associations between CMS VBP TPS and program director perceptions of value training persisted even after adjusting for hospital- and program-level proxies for patient population social risk and proportion of hospital discharges unlikely to be cared for by resident inpatient teams. Though program directors' perceptions of value training may be imprecise and imperfect because of the biases inherent in survey methods, no other value training measures are available at the residency level. VBP scoring incorporates benchmark thresholds, degree of improvement year-to-year, and fixed weighting of components to allocate points that contribute to the final score, which can complicate interpretation of VBP scores when comparing hospitals head-to-head. Although the VBP data used are derived only from Medicare patients, quality and relative costs among Medicare patients are routinely used to infer patterns in care for patients covered by other payers.[30] Despite these caveats, the VBP scores are the most comprehensive publicly reported value measures available.

Conclusion

These findings demonstrate the utility of publicly available teaching hospital clinical quality and cost-efficiency data to measure the extent to which trainees in IM residency programs are exposed to high-value care settings that prepare them for high-value practice. This information can help educators understand the inpatient environments in which residents are immersed, identify sites that best deliver value training, supplement learning at sites that lag in value-based care, and accelerate diffusion of best practices in value training within and across programs.

Declaration of Conflicting Interests

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