

# Using Relative Value Units to Measure Faculty Clinical Productivity

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**The objective of this project was to compare faculty productivity in teaching and nonteaching clinical settings. We hypothesized that teaching activity would have no impact on productivity. A mixed model, repeated measures analysis of variance was used to analyze average relative value units (RVUs) billed and to test for differences between clinics. Data were drawn from 4,956 clinical encounters made within a student, resident, and faculty clinic. Average RVUs per visit were similar in the three settings. Resident supervision increased faculty productivity, while student supervision had no impact on billed RVUs. Thus, RVUs can be used as a measure of faculty clinical productivity in different settings in an academic medical center. Precepting students does not appear to affect clinical productivity.**

**KEY WORDS:** faculty productivity; relative value units; resident training; student education.

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Academic health science centers are coming under intense financial pressures; thus, efforts are under way at many institutions to optimize faculty clinical productivity.<sup>1</sup> Faculty clinical productivity has been measured in various ways: for example, number of patient visits, procedures performed, visits billed, and dollars collected.<sup>2-6</sup> These measures are inadequate if adjustments are not made for differences in practice characteristics such as the complexity of patients' diseases, variations in the length of time spent with patients, and differences in types of reimbursement for patients seen in various settings. Relative value units (RVUs) offer one way to measure productivity directly. The Health Care Financing Agency uses RVUs as the measure of physician productivity to calculate reimbursement for Medicare patients. According to this system, professional services (except for hospital based-services such as clinical pathology, radiology, and anesthesiology) are given a unique weight in RVUs based on the amount of time spent with patients and problem severity using Current Procedural Terminology (CPT4) codes.<sup>7</sup> Total RVUs reflect the practice costs and professional work associated with delivering a clinical service.

At the same time as faculty are expected to optimize clinical productivity, many also have the added responsibility of supervising students and residents. The purpose of this study was to determine whether faculty clinical productivity, as measured by RVUs, is affected by teaching in outpatient clinics.

Three clinics were compared: a medical student clinic characterized by episodes with case patients in which two students were supervised by one attending physician, a resident continuity care clinic in which four internal medicine residents at various levels of experience saw the panels of patients assigned to them and were supervised by one attending physician, and a faculty primary care clinic in which clinical services were provided by faculty who did not supervise students or residents. Our hypothesis was that teaching in outpatient clinics—either students or residents—would result in reduced clinical productivity, primarily measured by average RVUs per half-day of clinic.

## METHODS

Fourteen attending physicians from the section of General Internal Medicine at the Medical College of Georgia were eligible for the study. Participants were included if they spent the majority of their time in one of the three clinical settings on a regular basis. No physician was included for analysis in more than one of the clinical settings. Because of conflicting clinic schedules, three physicians did not meet the inclusion criteria and were eliminated from the study. We used a retrospective analysis of billing records of 11 physicians who practiced in one of the three clinic settings for the 6 months of the study, January 1 through June 30, 1996.

We chose specific CPT4 codes, selected to control for patient care variations that might bias one clinic over another. Our goal was to reflect typical activities in our ambulatory health care clinics. We included for analysis only those visits of new and established patients classified under codes for "office and other outpatient medical services": i.e., CPT4 codes 99201-99205 and 99211-99215. We excluded uncommon patient care services such as consultations, office procedures, inpatient services, and family or telephone consultations. In a 6-month period, 4,987 billed patient encounters were available for analysis.

We used CPT4 codes to calculate the RVUs, which were summed for each half-day clinic. Average RVUs per half-day were used to test a hypothesis of no differences

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between clinics. We also examined average number of billed encounters and RVUs per billed encounter.

### Statistical Analysis

Descriptive statistics were used to assess comparability of the three clinics in terms of types of patients and CPT codes. The primary outcome variable defined to quantify physician productivity was the total RVUs produced for a half-day clinic. Secondary outcome variables of interest were the number of patient billings per half-day and half-day average RVUs. A mixed model, repeated measures analysis of variance was used to analyze the primary and secondary outcome variables for clinic differences. The random effect of provider was fit using a compound symmetric model, which was then grouped by clinic to allow for differences in variance components between clinics. The fixed effect of clinic and the effects of gender, academic rank, and private practice experience (yes/no) were tested using these underlying variances. Least-square means and their standard errors are reported. The differences between no-show rates in each of the clinics were adjusted using a  $\chi^2$  test of association. A Bonferroni adjustment of the  $p$  values was made for the multiple tests. SAS/STAT Proc Mixed software (SAS Institute, Cary, NC, 1996) was used for all analyses.

### RESULTS

As shown in Table 1, some differences were detected between the clinics in the percentages of new and established patients. More established patients with low to moderate severity (CPT code 99213) were seen in the resident clinic (71.2%) than in the faculty clinic (37%) ( $p < .05$ ). More new patients with low to moderate severity (CPT4 code 99202) were seen in the student clinic (47.4%) than in the resident clinic (4.5%) or faculty clinic (6.7%) ( $p < .01$ ). Physicians in the faculty clinic tended to care for a higher percentage (43%) of established patients with moderate severity (CPT4 code 99214) than those in the resident (24.4%) or student clinics (19.5%) ( $p < .05$ ). This code would tend to affect the productivity in favor of faculty clinics owing to the more severe diseases seen.

Table 1 also shows several measures of faculty productivity. The average numbers of billed encounters per half-day for physicians in the resident clinic were significantly higher ( $p < .001$ ) than those from the faculty or student clinics. The average RVUs per billed encounter did not differ significantly between the three clinics ( $p = .095$ ).

There was a significant difference between the clinics on half-day average RVUs ( $p = .0038$ ). The half-day average RVUs were significantly higher ( $p < .003$ ) for physicians in the resident clinic than for those in the faculty clinic and the student clinic. Gender, academic rank, and

**Table 1. Characteristics of Patients Seen in the Different Clinics over a 6-Month Period for Selected CPT Codes and Measures of Faculty Clinical Productivity**

Patient Characteristics	Clinic			<i>p</i> Value
	Faculty*	Resident	Student	
Number of visits	3,365	1,132	490	
New patients, %	18.6	7.8	28.0	.01
Established patients, %	81.4	92.2	72.0	.05
New patients in CPT4 code category, %				
Self-limited/minor—99201	1.4	2.3	8.8	.05
Low/moderate severity—99202	6.7	4.5	47.4	.05
Moderate severity—99203	21.0	29.5	35.0	NS
Moderate/high severity—99203	58.2	58.0	8.8	.01
Moderate/high severity—99205	12.6	5.7	0.0	.05
Established patients in CPT4 code category, %				
Minimal—99211	1.1	0.9	0.3	NS
Self-limited/minor—99212	9.0	2.8	12.2	.05
Low/moderate severity—99213	37.0	71.2	67.4	.01
Moderate severity—99214	43.0	24.4	19.5	.05
Moderate/high severity—99215	9.9	0.7	0.6	.05
Measures of faculty clinical productivity				
Half-day clinics, <i>n</i>	345	63	78	
Average billed encounters <sup>†</sup>	4.8 (0.41)	18.1 (1.2)	6.2 (1.1)	.001
RVUs per billed encounters <sup>†</sup>	1.5 (0.2)	1.2 (0.2)	1.1 (0.2)	.095
Total RVUs	2,507	1,338	569	
Average RVUs per half-day clinic <sup>†</sup>	7.2 (0.8)	22.0 (5.2)	7.0 (1.5)	.0038

\*CPT results for faculty clinic are based on full-day clinics. Thus, half of each days' billings were selected to obtain half-day comparisons of faculty clinical productivity.

<sup>†</sup>Least-square mean (SE).

private practice experience did not have an effect on physician productivity (all  $p > .20$ ).

## DISCUSSION

The study of faculty clinical productivity is important as academic medical centers adapt to managed care and shrinking patient care revenue. The resource-based relative value system converts effort and practice characteristics into RVUs for different levels of care.<sup>8-10</sup> Because RVUs reflect clinical effort rather than dollars billed or collected, this system can be used to measure physician clinical productivity independent of financial production. Increasingly, private insurers also are using RVUs.<sup>11</sup>

This study has shown that the RVU system can be used to assess the clinical productivity of teaching faculty in an academic health science center. We demonstrated that faculty physicians were significantly more productive when supervising resident physicians than when engaged in independent delivery of patient care with no teaching responsibilities. Supervising residents increased clinical productivity of faculty physicians 3-fold. Having students in the clinic did not affect faculty clinical productivity.

More studies need to be done using this method. Obviously, this study is limited in that data come from a single site and a small number of physicians. Also, we excluded the less clinically active physicians who are clearly an important part of the cost and productivity debate. As economic pressures on academic health centers mount, accurate measurement of teaching costs and clinical productivity becomes increasingly important. Studies using RVUs could measure the impact clinical teaching has on productivity in other settings. Further, this method of mea-

suring clinical productivity could be used to determine the impact of the recently instituted Health Care Financing Agency guidelines for teaching residents and students.

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