Quantifying Physician Teaching Productivity Using Clinical Relative Value Units

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OBJECTIVE: To design and test a customizable system for calculating physician teaching productivity based on clinical relative value units (RVUs).

SETTING/PARTICIPANTS: A 550-bed community teaching hospital with 11 part-time faculty general internists.

DESIGN: Academic year 1997-98 educational activities were analyzed with an RVU-based system using teaching value multipliers (TVMs). The TVM is the ratio of the value of a unit of time spent teaching to the equivalent time spent in clinical practice. We assigned TVMs to teaching tasks based on their educational value and complexity. The RVUs of a teaching activity would be equal to its TVM multiplied by its duration and by the regional median clinical RVU production rate.

MEASUREMENTS: The faculty members' total annual RVUs for teaching were calculated and compared with the RVUs they would have earned had they spent the same proportion of time in clinical practice.

MAIN RESULTS: For the same proportion of time, the faculty physicians would have generated 29,806 RVUs through teaching or 27,137 RVUs through clinical practice (Absolute difference = 2,669 RVUs; Relative excess = 9.8%).

CONCLUSIONS: We describe an easily customizable method of quantifying physician teaching productivity in terms of clinical RVUs. This system allows equitable recognition of physician efforts in both the educational and clinical arenas.

KEY WORDS: relative value scales; medical education; medical faculty; teaching; employee performance appraisal.

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Many community teaching hospitals and academic medical centers have faculty members who dedicate a portion of their time to teaching. Often, this portion is defined as a fraction of a full-time equivalent position (FTE). However, because of the wide spectrum of attending, didactic, and administrative tasks considered to be teaching activities, it can be difficult to quantify the amount of teaching expected for a given FTE.

Because teaching productivity is not easily quantified, it may be undervalued and poorly compensated. During the 1992-93 academic year, full-time Department

of Medicine faculty members at one academic institution were paid approximately \$16 per hour for teaching.¹ This is paltry compared with the 1991 average hourly wage of \$56 for male and \$49 for female physicians in their second to ninth year of clinical practice.²

Because of financial pressures caused by increasing market competition, faculty members at many medical institutions have been asked to increase their clinical productivity (*Philadelphia Inquirer*, March 21, 1998: A-1). This increase may occur at the cost of decreased clinical research and diminished faculty development.³ Similarly, we believe increased clinical demands may hinder teaching efforts. If a means could be established to measure faculty clinical and educational activities on the same scale, the time and effort required for teaching could be compared to clinical activities.

Unlike teaching, clinical productivity is easily measured using systems employing resource-based relative value units (RVUs). Medicare physician reimbursement is calculated by assigning RVUs to physician services based upon their complexity, as codified by *Physicians' Current Procedural Terminology*.^{4,5} The complexity of a service, in turn, depends primarily on the degree of physician work required. According to Hsiao and colleagues, physician work has four dimensions: (1) time, (2) mental effort and judgment, (3) technical skill and physical effort, and (4) psychological stress.⁶

As with clinical work, teaching has different levels of complexity depending on the teaching task. For example, teaching a resident in an outpatient clinic about treatment of otitis media has a different level of complexity than attending on a hospitalized patient with bilobar pneumonia. Like clinical complexity, teaching complexity possesses four components: (1) time required for the teaching task, (2) educational value, (3) labor intensity, and (4) degree of patient risk and responsibility assumed.⁷ Furthermore, these four components are analogous to the components that make up clinical complexity. The time required for service plays a large part in determining task complexity in both clinical and teaching arenas. The educational value of a teaching activity is analogous to the mental effort and judgment required by a complex clinical task. In both cases, the clinician-educator judiciously applies and imparts a body of specialized knowledge to the subjects, whether they are students or patients.

Like clinical activities, teaching tasks have varying labor intensities and require different levels of physical effort and technical skill. For example, giving grand rounds requires a different level of effort and skill than attending on new admissions for a postcall ward team. Finally, the psychological stress experienced by the clinician, which is

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due to the complexity and acuity of the patient's case, is represented by the degree of risk and responsibility assumed by the clinician-educator. Because clinical complexity and teaching complexity are analogous in structure and concepts, it is both possible and reasonable to place them on the same value scale.

We sought to design and test an easily customized, three-step process for calculating physician teaching productivity based on clinical practice RVUs. Because clinical RVUs are earned according to the complexity of the patient encounter, we devised a similar concept, the teaching value multiplier (TVM), to address the differences in complexity of various teaching tasks.

The TVM is a ratio describing the worth of a given unit of time spent teaching relative to the equivalent amount of time spent on clinical activities. Just as the RVUs for a patient encounter depends on its clinical complexity, the TVM for an educational activity depends on its teaching complexity. The RVUs generated through teaching would be calculated by the following formula:

$$\text{RVU} = \text{TVM} \times \text{Time required by activity} \times \frac{\text{Regional median clinical RVU production rate}}{\text{Regional median clinical RVU production rate}}$$

We related all RVU calculations to the regional median RVU production rate to ensure that teaching physicians would be compensated at no better or worse than the median rate for other area physicians. Therefore, there would be no excessive financial reward or penalty for teaching.

According to our formula, 1 hour spent on a teaching activity with a TVM of 1.0 has the same value as 1 hour spent in clinical practice at the median productivity level.

Similarly, 1 hour spent on a teaching activity with a TVM of 2.0 has the same value as 2 hours spent in clinical practice.

Using the above formula, we calculated the number of RVUs generated through teaching by faculty internists at our institution. This was then compared with the number of RVUs these physicians would have earned if they had spent their teaching FTE solely in clinical practice working at the median productivity level.

METHODS

Our study took place at St. Joseph Mercy Hospital, a 550-bed community teaching hospital in Ann Arbor, Mich. During the 1997–98 academic year, our internal medicine residency program employed a core faculty of 11 general internists who together have 5.1 FTEs dedicated to teaching. The remainder of each internist's time was spent in clinical practice, in which each physician annually generated significantly greater than the regional median RVUs.

The first of the three steps in our system was to list all the teaching and administrative tasks our faculty members performed. This information was obtained through department schedules and faculty questionnaires. We also tallied the number of hours each task required, including preparation time (Table 1). For example, morning report, which lasts 1 hour, was allotted an additional hour for preparation.

We included preparation time in our calculations to recognize the substantial planning necessary to teach

Table 1. Summary of Educational Duties for 11 Faculty Internists at St. Joseph Mercy Hospital, Ann Arbor, Michigan*

Activity	TVM	Time, Hours	Annual Number of Positions	Annual RVU†
Attending				
Inpatient attending (1 month)	2.0	54.0	36	14,035.7
Resident clinic attending (1 half-day)	1.0	3.5	576	7,277.8
Didactics				
Morning report	1.5	2.0	192	2,079.4
Intern report	1.5	2.0	20	216.6
Medical student conference	1.5	2.0	40	433.2
Noon conference	1.5	8.0	25	1,083.0
Administrative				
Directors				
Inpatient wards	0.8	184.0	1	531.4
Resident clinic	0.8	184.0	2	1,062.8
Supervisors‡	0.8	92.0	5	1,328.5
Coordinators§	0.8	46.0	4	531.4
Miscellaneous				
Faculty meetings	0.4	1.5	506	1,096.0
Recruitment interviews	0.8	0.5	90	130.0
Total				29,805.6

*TVM indicates Teaching Value Multiplier; RVU, Relative Value Unit.

†Annual RVU = TVM × Time × Number × 3.61 RVUs/h (median clinical production rate).

‡Examples: scheduling, conference curriculum, housestaff research.

§Examples: home visits, resident evaluations, women's health curriculum.

effectively. The time our faculty spent preparing to teach could have easily been spent on clinical work instead. Preparation time was estimated for the activities through informal polls of faculty members. For lectures, the allotted times account for both initial and repeated presentations. If preparation time were not included in our calculations, the number of RVU generated through didactic activities would have decreased.

Because the times required for administrative activities varied considerably, these functions were divided into three classes, ranked by importance and average weekly time: "directors" (averaging 4 hours per week), "supervisors" (averaging 2 hours per week), and "coordinators" (averaging 1 hour per week). Examples are listed in Table 1.

The second step was to set the TVM for each activity. We set a baseline TVM of 1.0 for attending in the residents' outpatient clinic; that is, 1 hour spent attending in the resident clinic was deemed equivalent in clinical complexity to 1 hour spent in our own clinical practice. This baseline TVM was established after comparing the teaching and supervising duties of a resident clinic attending with the clinical tasks of a general internist. At our institution, both activities are roughly equal in effort and complexity. For other institutions, this may be a conservative estimate as data suggest that a resident clinic attending can generate more than three times as many clinical RVU per half-day as a typical faculty clinic.⁴

As with clinical activities, the intensity of a teaching activity may vary from week to week. For example, the pace of our resident clinic depends on the number of residents present. Our system could have accounted for this variation by setting different TVMs depending on the number of residents. However, this would have made the system too unwieldy. We therefore set a single TVM that reflected the average attending effort required at the resident clinic.

The TVM values of all teaching activities were agreed upon during discussions between the residency program director and faculty members through a magnitude estimation process.⁶ Via a dialogue between the program director and faculty members, we rated the complexity of teaching tasks relative to the baseline complexity of attending in the resident outpatient clinic during an average week. This was done using a ratio scale so that activities with a TVM of 2.0 were considered twice as complex as those with a TVM of 1.0. When determining complexity, we took into account the educational value of the activity (including the degree of resident contact and patient complexity), the labor intensity of the activity, and the degree of patient risk and responsibility assumed. For example, we set a TVM of 2.0 for attending duties in the inpatient ward compared with a TVM of 1.0 for attending in the outpatient clinic. The higher value for inpatient ward attending reflects more intense contact with residents, higher average patient complexity, the greater physical effort required, and the greater degree of assumed patient responsibility.

We divided educational activities into three broad categories based on the degree of contact with residents: attending, didactics, and administration. Attending activities had the highest relative TVM because they involved direct resident supervision and bore a significant degree of patient responsibility. These activities included extemporaneous teaching during rounds and in small groups. Purely didactic activities, such as noon conferences, carried intermediate TVM because of their educational value and because they included less intense contact with several residents. Administrative activities had relatively low TVM because they did not include direct resident contact. However, because administrative tasks are vital to the success of a residency program, the TVM could not be set so low as to penalize faculty members for performing them. The TVM for our educational activities are listed in Table 1.

The third and final step was to calculate the RVUs for each teaching activity according to our formula described above. We used the 1996 Medical Group Management Association Midwest section median clinical production rate for general internists of 5,321 RVUs per year or 3.61 RVUs per hour.⁸ Using our formula, a faculty member who attends on the inpatient wards would earn 389 RVUs per month. This is calculated by multiplying the TVM for inpatient attending (2.0) by the time required per month (54 hours) by the clinical productivity rate (3.61 RVUs per hour). Table 1 lists the calculated RVUs for all teaching activities performed by the 11 faculty members. For attending and didactic tasks, it details the annual number of clinics or lectures. For administrative tasks, it lists the number and type of faculty positions. The last column quantifies the annual RVUs generated by each activity.

The total number of RVUs the faculty members produced through their educational activities was compared with the number of RVUs they would have earned had they applied their teaching FTE to clinical practice. This calculation was done to test the degree to which the RVUs generated through this system matched the potential RVUs earned through clinical practice. If these numbers were similar, then our system could be assumed to be an accurate representation of physician work through teaching and can be realistically applied to our clinician-educators. To calculate this figure, each faculty member's teaching FTE was multiplied by the regional median clinical production rate. For example, we calculated that a faculty member with a 0.35 FTE in teaching would have earned 1,862 RVUs annually through clinical practice for the same FTE.

RESULTS

Following these three steps, we tallied all the teaching and administrative tasks performed by the 11 faculty internists and calculated the total number of RVUs they generated through teaching. A representative individual faculty profile is illustrated in Table 2. The 11 faculty

Table 2. Individual Profile of a Faculty Internist with a 0.35 FTE in Teaching*

Activity	TVM	Time, hours	Annual Number of Positions	Annual RVU [†]
Attending				
Inpatient attending (1 month)	2.0	54.0	3	1,169.6
Resident clinic attending (1 half-day)	1.0	3.5	36	454.9
Didactics				
Morning report	1.5	2.0	25	270.8
Noon conference	1.5	8.0	2	86.6
Administrative				
Supervisor: ambulatory care rotation	0.8	92.0	1	265.7
Miscellaneous				
Faculty meetings	0.4	1.5	46	99.6
Recruitment interviews	0.8	.05	9	13.0
Total				2,019.1[‡]

*TVM indicates teaching value multiplier; RVU indicates relation value unit.

[†]Annual RVU = TVM × Time × Number × 3.61 RVUs/h (median clinical production rate).

[‡]A 0.35 FTE in clinical practice at the regional median clinical productivity rate would generate 1,862 RVU.

members together produced 29,806 RVUs through their teaching and administrative activities.

If they were to spend their teaching FTE on clinical practice instead, they would have generated 27,137 RVUs at the median clinical productivity level of 5,321 RVUs per year. This absolute difference of 2,669 RVUs (relative excess 9.8%) is equal to 0.50 FTE.

DISCUSSION

We have developed a simple method for quantifying physician teaching productivity in terms of clinical RVU production. The basis of this system is the teaching value multiplier, which is a ratio describing the worth of a unit of time spent teaching relative to the same unit of time spent in clinical practice.

When this system was applied to our institution, our faculty internists produced only 10% more RVU through their educational activities than they would have if they had applied their teaching FTE to clinical practice at the regional median production rate. This inequality was addressed at our institution by increasing the number of FTE dedicated to teaching. Individual faculty profiles generated through our method also allowed our residency program to equitably redistribute the teaching load among faculty members. We are currently using this system to monitor quarterly faculty RVU production through teaching.

A review of the literature reveals two previous efforts to quantify teaching through RVU-based systems. Bardes and Hayes at Cornell ranked the relative worth of different teaching tasks but did not relate them to clinical productivity.⁷ Hilton and colleagues at Louisiana State University devised a system that compared clinical, administrative, teaching, and research tasks on a single value scale; however, they did not link their scale to the standard RVU scales used by Medicare and other insurance companies.⁹

Our relative valuations of teaching activities were similar to the ones established by these two sets of authors. For example, like Bardes and Hayes, we assigned inpatient attending twice the value of outpatient attending.⁷

Our system is primarily applicable to physicians who are employed to teach and to generate institutional income through teaching activities. For example, it would be relevant to academic medicine attending physicians who supervise residents but do not directly receive revenue for doing so. It would be less pertinent to private practitioners who directly bill for the patients they see in conjunction with residents. Furthermore, our system is currently applied only to general internist faculty and not to subspecialists. However, institutions that use this system could extend it to their subspecialists by determining the TVM of their activities, including inpatient consultations and procedural training.

A common criticism of any proposal that seeks to equate educational with clinical compensation is that housestaff teaching does not directly produce revenue. However, residency programs do create significant income both through the clinical earnings generated by housestaff and through their subsidization by the federal government. Medicare's direct payments to hospitals for residency program support totaled \$2.2 billion in fiscal 1997, with a mean of \$62,700 per resident in 1995. Medicare also paid an additional \$4.6 billion in fiscal 1997 to compensate for the added patient care costs associated with teaching programs.¹⁰ Because teaching and clinical activities both produce income, an RVU-based system allowing them to be assessed on the same scale would ensure that clinician-educators are rewarded appropriately.

We recognize that clinician-educators often have a high degree of career satisfaction because of teaching's intrinsic rewards, such as the satisfaction of watching students achieve, the privilege of being a mentor, and the joy of teaching itself.^{11,12} However, in an era when teaching efforts are threatened by clinical pressures, we feel that a

system to quantify the value of teaching is vital to the success of any residency program.

Our three-step system offers an easily customized means for calculating physician teaching productivity. Each institution that uses this system should determine its own TVM for its educational activities based on its assessment of their relative worth. Rewards and penalties for teaching quality can also be factored into these calculations by modifying TVM according to teaching evaluations. This method therefore provides a means for evaluating and equating physician efforts in both the educational and clinical arenas.

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