ORIGINAL ARTICLES

Rewarding Teaching Faculty with a Reimbursement Plan

Gregory W. Rouan, MD, Robert G. Wones, MD, Joel Tsevat, MD, MPH, John H. Galla, MD, John W. Dorfmeister, MA, Robert G. Luke, MD

OBJECTIVE: To develop a system for measuring the teaching effort of medical school faculty and to implement a payment system that is based on it.

DESIGN: An interventional study with outcomes measured before and after the intervention.

SETTING: A department of internal medicine with a university hospital and an affiliated Veterans Administration hospital.

INTERVENTION: We assigned a value in teaching units to each teaching activity in proportion to the time expended by the faculty and the intensity of their effort. We then calculated total teaching units for each faculty member in the Division of General Internal Medicine and for combined faculty effort in each subspecialty division in the Department of Medicine. After determining the dollar value for a teaching unit, we distributed discretionary teaching dollars to each faculty member in the Division of General Internal Medicine and to each subspecialty division according to total teaching units.

MEASUREMENTS AND MAIN RESULTS: The distribution of discretionary teaching dollars was determined. In the year after the intervention, there was a substantial redistribution of discretionary teaching dollars among divisions. Compared with an increase in total discretionary dollars of 11.4%, the change in allocation for individual divisions ranged from an increase of 78.2% to a decrease of -28.5%. Further changes in the second year after the intervention were modest. The distribution of teaching units among divisions was similar to the distribution of questions across subspecialties on the American College of Physicians In-Training Examination ($r = .67$) and the American Board of Internal Medicine Certifying Examination ($r = .88$).

CONCLUSIONS: It is possible to measure the value of teaching effort by medical school faculty and to distribute discretionary teaching funds among divisions according to the value of teaching effort. When this intervention was used at our institution, there were substantial changes in the amounts received by some divisions. We believe that the new distribution more closely approximates the desired distribution because it reflects the desired emphasis on knowledge as measured by two of the most experienced professional groups in internal medicine. We also believe that our method is flexible and adaptable to the needs of most clinical teaching departments.

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Missions of clinical departments, of which the department of medicine is often the largest, include educating medical students and residents, caring for patients, and conducting research in basic and clinical science. The funding of clinical departments has become increasingly dependent on payment from clinical activities,^{1,2} and traditionally these funds have been used to subsidize both the educational and research activities of full-time faculty.³⁻⁷ The advent of managed care is both reducing the funds paid to clinical faculty for their clinical services and increasing the demand for accountability of time and effort in delivering services.⁸⁻¹¹ Productivity, accountability, and cost-effective delivery are the new bywords.

Productivity in patient care is easily measured by indicators such as the number of covered lives, the number of procedures performed, the volume of patient care revenues, the level of patient satisfaction, and the number of ambulatory visits. Success in research can be measured by the number and quality of publications and invited presentations and by the level of extramural funding. Productivity in teaching is much more difficult to assess; models for reimbursing teaching efforts have been proposed at both the collegiate and departmental levels but not implemented.^{6,12-15} This article describes the experience of one department of medicine's use of the Teaching Recognition and Reimbursement Plan over three academic years. This plan explicitly measures and rewards the effort of faculty who teach medical students and housestaff.

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Address correspondence and reprint requests to Dr. Rouan: University of Cincinnati, College of Medicine, 231 Bethesda Ave., Cincinnati, OH 45267-0557.

Owing to a shift of patient care into ambulatory settings over the past few years, 4 of the 8 weeks of the third-year medical clerkship at the University of Cincinnati are currently spent in an ambulatory setting. Medical students at this institution also spend another 8 weeks in inpatient medicine during their senior year. The shift to ambulatory medical education considerably increased the demand for faculty time devoted to educational activities.¹⁶ At the same time, several pressures forced the College of Medicine to reconsider the distribution of general funds among departments. Under these circumstances the dean determined that the education of medical students was the main purpose of university general funds in clinical departments.

The University of Cincinnati Department of Internal Medicine is organized on a decentralized fiscal model with net clinical collections, grant support, and funds for education allocated to each division. The divisions, in turn, have responsibility for faculty salaries and professional support. The educational funds distributed by the department to the eight subspecialty divisions come from university general funds, Medicare Part A funds from University Hospital, some continuing clinical practice plan contributions, and endowments for education. These funds totaled \$2,874,875 in 1997–98. Because most of the housestaff and student teaching is performed simultaneously by the attending physician, we have comingled these funds for distribution by the new payment plan.

General Internal Medicine is the largest division in the Department of Medicine, and it has a growing responsibility for teaching in both inpatient and outpatient settings. In 1994 University Hospital entered an alliance with three other systems that included five hospitals. With the development of this alliance, the clinical activities of the Division of General Internal Medicine faculty became the responsibility of an alliance-wide primary care entity. This change necessitated a split of faculty salary into an alliance payment for clinical services and a departmental payment for teaching. Payment for clinical services was based on clinical productivity. The Division and the Department's need to develop a system to pay faculty for teaching stimulated the development of the activities that we describe here.

METHODS

A faculty task force made up of both clinician-educators and tenured, research faculty first identified the Department's teaching activities. Teaching activities were defined as those faculty activities in which either medical students or housestaff were present. (Table 1 shows the activities for the second year of the study, 1996–97.) These activities included inpatient and consult attending duties, outpatient precepting, teaching physical diagnosis, conducting morning report, and presenting clinical and basic science lectures. Activities that involved only graduate students and clinical fellows were excluded. The task force carefully

measured the faculty teaching time expended on each activity. For activities without direct patient contact, all faculty time was credited to teaching. Because Medicare funds expended for patient care involve both teaching (paid by Part A funds) and direct patient care (paid by Part B funds),^{17,18} we attempted to disaggregate education from service. Of the total time devoted by faculty during clinical activities involving students or housestaff, the task force assigned 50% to teaching. Therefore, for ward attending, consult attending, or outpatient precepting duties, only 50% of the total time was credited to teaching, and the other 50% was credited to patient care.

Assignment of Teaching Units to Activities

Each teaching activity was assigned a value based for the most part on the total hours spent teaching and the intensity of faculty effort, as determined by the task force. For example, serving as attending physician on the University Hospital inpatient general medical ward service requires approximately 4 to 8 hours per day, which is equivalent to 2 to 4 hours of teaching activities per day, approximately 25 teaching hours per week, or 100 teaching hours per month. Therefore, the task force estimated total teaching units for this activity at 100 units per month. In calculating teaching units, the committee took into account whether or not time was required for preparation and whether exit evaluations of students or housestaff were necessary. For example, preparing for and speaking at medical grand rounds was assigned 10 units.

To calculate the total number of teaching units for each activity, the teaching units assigned to each teaching activity were multiplied by the number of times that activity was scheduled during the year. For example, each University Hospital inpatient service was credited with 100 units per month. There are four general medicine and four subspecialty inpatient services at University Hospital, which means that there are 96 months of inpatient services per year. Multiplying 96 months by 100 teaching units per month gives a total of 9,600 total teaching units assigned to this activity. To calculate the total number of teaching units in the Department, the total teaching units for each activity were added together. Each division also received 200 "general teaching activity units" to recognize miscellaneous teaching responsibilities not otherwise accounted for by the plan. Overall, there were 45,390 teaching units for all of the departmental teaching responsibilities in academic year 1996–97.

Implementation of the new system started in the Division of General Internal Medicine in 1995–96. Several divisional teaching activities that are not included in Table 1 were included in the system, such as precepting in the residents' medical clinic and precepting in a new student clinic. Because there had been substantial cross-subsidization of teaching in the Division from the Department's practice revenues before the plan was implemented, the dean increased the Division's financial support to replace

Table 1. Teaching Units by Major Teaching Activity in 1996–97

Duration	Activity	Teaching Units	Total Units Per Year
1 Month	University Hospital attending*	100/month	9,600
1 Month	VAMC attending†	70/month	5,180
1 Month	Morning report	20/month	480
1 Month	Divisional consultation‡	50–150/month	
	Inpatient consults		
	240 patients/year	25/month	900
	240–599 patients/year	50/month	3,000
	600 patients/year	75/month	4,500
	Outpatient visits		
	800 patients/year	25/month	900
	800–1,499 patients/year	50/month	1,800
	1,500 patients/year	75/month	8,100
1 Year	Physical diagnosis§		1,360
1 Lecture	Basic science lecture	10/lecture	1,105
1 Lecture	Clinical pathologic conference	10/lecture	110
1 Lecture	Grand rounds	10/lecture	370
1 Lecture	Resident conference	5/lecture	145
1 Lecture	Professors' rounds	5/lecture	720
1 Month	Office precepting (1/2 day/week)	5/session	5,520
	Unspecified general teaching¶	200	1,600
	Total units		45,390

*University Hospital team includes general medical ward teams, subspecialty teams, and critical care teams.

†Veterans Administration Medical Center team includes subspecialty teams and critical care teams.

‡Total teaching units for consultation services for each division were determined by the number of patients seen per year on the inpatient service and in the ambulatory setting.

§There are 68 students assigned to University Hospital and the VAMC for physical diagnosis. They are divided into groups of 4. Each group (17 total) participates in 12 precepting sessions per year ($17 \times 12 = 1,020$ units). In addition, each student is individually mentored during one other exam session ($68 \text{ sessions} \times 5 \text{ units per session} = 340$ units). Thus, the total number of units assigned to physical diagnosis equals 1,360.

¶Department general allocation to each subspecialty division is in recognition of miscellaneous teaching activities not accounted for by the Teaching Recognition and Reimbursement Plan.

the dollars lost from cross-subsidization. This support was not counted in the Department's discretionary teaching dollars. In this implementation, all the Division's support from the Department and from the dean were allocated to individual faculty members according to their percentage of the Division's total teaching units. The level of support for the Division remained constant during the next 2 years, although allocations to individuals changed when their teaching units changed.

We modified the new system when we implemented it in the other divisions in 1996–97. The Division of General Internal Medicine received a constant level of support and used the plan to allocate its support to individual faculty members. In contrast, under the modified system the other divisions received their support from the Department in two different ways. Each division received one half the base support it had received during the previous year. Each division also received some of the Department's remaining discretionary teaching funds in proportion to the division's level of teaching activity. Therefore, each of the other divisions received a combination of fixed and variable levels of support. Also, each division decided separately how to allocate its support to individual faculty members. Some divisions allocated this support indepen-

dently of the new system, and other divisions allocated support similarly to the Division of General Internal Medicine. The purpose of modifying the system was to recognize existing salary commitments to tenured faculty, keep historical commitments to division directors, and make it easier for divisions to manage changes in their budgets.

Analysis

We used Kendall τ_b to correlate the proportion of teaching units allocated to each division with the number of questions from each subspecialty on the 1994–1996 version of the American College of Physicians In-Training Examination and the 1995–1997 versions of the American Board of Internal Medicine certification examinations. All analyses were performed using SAS (Release 6.11, SAS Institute Inc., Cary, NC) and Excel (Microsoft, Redmond, Wash).

RESULTS

Allocation of Teaching Units and Dollars by Division

The distribution of teaching units to all divisions for 1996–98 is described in Table 2. The value of a teaching

Table 2. The Distribution of Teaching Units by Division in 1996–97 and 1997–98

Division	Distribution of Teaching Units, %
Cardiology	14.4
Digestive Diseases	10.6
Endocrinology	2.9
Hematology/Oncology	12.6
Infectious Diseases	8.0
Immunology	6.9
Nephrology	8.6
Pulmonary	11.0
General Internal Medicine	25.0

unit in 1996–97 was \$94, and in 1997–98 it was \$100. Implementation of the new system had a substantial effect on the allocation of teaching funds for some subspecialty divisions (Table 3). Overall, the total discretionary teaching dollars for divisions other than the Division of General Internal Medicine increased 11.4% from 1995–96 to 1996–97. The change for individual subspecialty divisions ranged from a dollar increase of 78.2% for the Division of Digestive Diseases to a decrease of –28.5% for the Division of Endocrinology. If the changes are expressed in relative terms, the Division of Digestive Diseases gained the most (with an increase from 6.8% of the Department's total to 10.9% for a relative increase of 60.3%), while the Division of Endocrinology lost the most (with a decrease from 9.9% of the Department's total to 6.4% for a relative decrease of 35.4%).

Sensitivity Analyses

With implementation of the new system in 1996–97, 75% of teaching funds were spent on inpatient teaching and consultation. The base case analysis assumed that 50% of the total time spent on ward attending, consult attending, or outpatient precepting duties would be credited

to teaching, with the other 50% credited to patient care. If only 25% of total time spent in these three activities was credited to teaching and the remaining 75% was credited to patient care, then ward attending, consult attending, and outpatient precepting duties would lead to fewer teaching dollars and activities such as lecturing, conducting conferences, and teaching physical diagnosis would lead to more teaching dollars (Fig. 1). For example, teaching conferences would receive 11% of teaching dollars rather than 6%. Conversely, if 75% of time spent on clinical services was credited to teaching, then only 4% of teaching dollars would go to teaching conferences. Changing the proportion of time credited to teaching, however, had little effect on the allocation of teaching monies across divisions. Whether the level credited to teaching was changed from 50% to either 25% or 75%, no division gained or lost more than 1% of the total funds available for teaching.

Correlations

The allocation of teaching units correlated well with the specialty content of the American College of Physicians In-Training Examination ($r = .88$, $p = .001$) and the American Board of Internal Medicine certification examination ($r = .67$, $p = .012$) (Table 4). The major disparity between teaching monies and examination content was in the Division of Endocrinology, which received only 2.9% of funds but had 7% to 9% of examination questions.

DISCUSSION

The goal of the new system was to recognize and reward the teaching efforts of the faculty in the Department of Medicine according to their time and effort. Our analyses show that some divisions were greatly affected by the new plan.

Table 3. The Distribution of Discretionary Teaching Dollars by Subspecialty Division*

Division	Teaching Dollars Before Implementing the Plan	Teaching Dollars After Implementing the Plan	
	1995–96 (%)	1996–97 (%)	1997–98 (%)
Cardiology	389,500 (15.5)	512,340 (18.3)	437,750 (15.2)
Digestive Diseases	171,000 (6.8)	304,755 (10.9)	295,500 (10.3)
Endocrinology	250,000 (9.9)	178,815 (6.4)	218,500 (7.6)
Hematology/Oncology	494,000 (19.7)	515,135 (18.4)	468,000 (16.3)
Immunology	313,000 (12.4)	295,855 (10.6)	337,750 (11.7)
Infectious Diseases	335,750 (13.4)	303,705 (10.8)	383,625 (13.3)
Nephrology	361,000 (12.6)	353,460 (12.6)	403,000 (14.0)
Pulmonary	199,500 (7.9)	336,630 (12.0)	330,750 (11.5)
Total divisional†	2,513,750 (100.0)	2,800,695 (100.0)	2,874,875 (100.0)

*The Division of General Internal Medicine was not included in the comparative analyses calculations as the dollars allocated to it did not change during the three academic years (i.e., its teaching allocation was directly through the College of Medicine).

†Percentages in column may not add to 100.0% because of rounding errors.

FIGURE 1. Impact of varying the proportion of time credited to teaching for ward attending, consult attending, and office duties (1996–97). Unspec. Teach. indicates unspecified teaching; Phys. Dx., physical diagnosis; Teach. Conf., teaching conference; Consult., consultation; Inpt. Teach., inpatient teaching.

We designed this plan knowing that the major difference between our situation and that of others is the amount of the medical school's teaching budget assigned to the department of medicine. Funds available for teaching vary considerably from institution to institution.^{13,19} For example, Shea and colleagues, in an analysis in a department of medicine at a private New York medical school, estimated that, on average, only 245 hours per year were spent on teaching per faculty member with considerably less reimbursement available for that teaching.¹³ We determined that our faculty averaged approximately 400 hours of teaching per year. Our plan, if widely adopted, might facilitate more objective comparisons of teaching costs between institutions.

Another advantage of the plan has been an increased awareness of, and attention to, the importance of teaching within the Department of Medicine, especially by division leaders. When collections from practice activities, grants, and clinical trials are measured, but the resources devoted to teaching are not, there is a danger that the

time and effort required for teaching will be greatly de-emphasized.

Measurement of teaching responsibilities is of value not only for allocating dollars among divisions, but also for distributing dollars to individual faculty within divisions. Under the new plan, faculty can tailor their teaching load to their needs (within certain parameters). At our annual review of each faculty member, we examine the net cost for salary and fringe benefits versus productivity in collections from patient care, grants, clinical trials, and "earned" teaching funds.

After implementation of the new system, most faculty kept the same teaching activities they had in the past. A few increased their teaching activities as a result of the plan's incentive to do so, while others chose to reduce their teaching load slightly. Individual faculty members did not have complete freedom to add or drop teaching activities because each division had fixed clinical and teaching responsibilities.

The plan provides flexibility for each faculty member to provide different teaching services within a fair reward system. It facilitates easy definition of a minimum teaching effort for faculty. The plan allows fair distribution of teaching workload between divisions and also allows division heads to meet responsibilities by distributing the division's teaching responsibility among faculty members according to their relevant roles and skills.

In subsequent drafts of the plan, we will implement additional measures of the *quality* of the educational efforts, as assessed by students' and house officers' faculty evaluations, and by the number of students and house-staff selecting a given rotation. We plan to allocate approximately 5% of the teaching funds to a merit pool from which individual divisions and faculty will be recognized for excellent performance.

Our correlation analysis demonstrates that our teaching units are being allocated in proportion to the content of training and certification examinations. Other institutions may wish to go through a similar analysis to see whether teaching funds are in line with such benchmarks.

Table 4. Distribution of Questions on the American College of Physicians (ACP) In-Training Examination and the American Board of Internal Medicine (ABIM) Certifying Examinations

Division	Distribution of Questions on the ACP Exam 1994–1996, %	Distribution of Questions on the ABIM Exam* 1995–1997, %	Distribution of Teaching Units 1996–1998, %
Cardiology	12.0	14.0	14.4
Digestive Diseases	10.0	10.3	10.6
Endocrinology	9.0	7.0	2.9
Hematology/Oncology	10.0	13.0	12.6
Infectious Diseases	9.7	9.0	8.0
Immunology	9.0	10.0	6.9
Nephrology	9.3	6.0	8.6
Pulmonary	10.0	9.7	11.0
General Internal Medicine	21.0	21.0	25.0

* Only after 1995 did it become possible to look at a breakdown of "non-core" questions by subspecialty for the ABIM exam.

We believe that our plan for paying faculty who teach could serve as a model for other institutions because it rewards effort in proportion to the time expended and in proportion to the desired emphasis on content as measured by two of the most experienced professional groups in internal medicine. As similar plans are implemented at other sites, they should be evaluated to measure their impact on faculty satisfaction and teaching quality.

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