

## Cost-Benefit Analyses of California Family Practice Residencies

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*Several national commissions have recommended that family practice residency training be subsidized, but without stating how much support is needed. Financial studies of graduate medical education have used the methods of cost allocation or joint-products cost analysis. Previous cost-allocation studies indicate that one third of family practice residency costs are met by extramural subsidy.*

*Cost reports of eight California public hospitals with a single family practice residency program were evaluated for the 1984-85 fiscal year. Discrepancies in the education costs reported to Medicare and those reported in state hospital disclosure reports demonstrate the arbitrary nature of the cost-allocation method. The Medicare medical education reimbursement was an average of \$20,444 per resident. State and federal grants provided an average of \$5,190 per resident. The Medicare payments and grants met an average of 35.7% of the education costs reported to Medicare.*

*A joint-products cost analysis was used to estimate the pure cost of education in an 18-resident family practice residency. Replacing the residency with salaried physicians would have decreased the hospital's net return by \$143,534. If neither grants nor Medicare education payments had been received, elimination of the program would have increased hospital net return by \$428,083.*

In its first report to Congress, the Council on Graduate Medical Education (COGME) found that despite an overall surplus of physicians, the United States has too few primary care physicians, and that family physicians are in especially short supply.<sup>1</sup> The council recommended that federal, state, and private support for family physician training be expanded.

Six previous national commissions found that primary care training programs cannot earn enough patient care income to meet expenses and recommended that these residencies be subsidized.<sup>2-7</sup> Neither these commissions

nor COGME explicitly stated how significant this support must be. Such imprecision can be attributed to the dearth of studies documenting the cost of graduate medical education in primary care.

Conceptually, it is not difficult to understand why support is needed. Ambulatory-based training generates less revenue than programs in the procedurally oriented specialties, where hour for hour, physicians earn five to ten times as much as can be garnered from giving outpatient care.<sup>8</sup> Moreover, ambulatory programs collect a smaller percentage of charges, as third-party payers reimburse fully for hospitalization but require out-of-pocket contributions for outpatient visits.

The low reimbursement is compounded by the high cost of teaching in an outpatient setting. Much of hospital-based teaching occurs with the faculty physician teaching a group of residents in regularly scheduled rounds. In contrast, ambulatory patients are available for a short time each visit, and the faculty physician not only teaches a single resident at a time, but also must continue to be available throughout clinic hours. In short, ambulatory-based training is a more labor-intensive process. Further-

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more, the resources needed to teach behavioral sciences constitute an additional expense unique to family practice residency training.

This paper describes the issues involved in quantifying the finances of family practice training and the methods used, and reviews published studies that have employed cost-allocation methods to evaluate family practice training programs. Also presented are financial data from eight residency programs as well as an estimate of the pure cost of education in one of these programs using a joint-products cost analysis.

## GRADUATE MEDICAL EDUCATION COST-BENEFIT METHODS

Two methods have been used to study the revenues and expenses of graduate medical education. Each method has its appropriate use and its drawbacks.

The *cost-allocation method* is used to prepare hospital cost reports. It generates a number that purports to represent total educational cost. The costs of the hospital (or medical school) are assigned to mutually exclusive "products" of education, research, and patient care, using a time analysis of physician activities. Cost-allocation studies rarely have guidelines or criteria for the activity analysis, and physician time reports are often completed by an accountant or administrator, not the individual physician. Even when objective standards are established, cost allocation is inherently arbitrary in an enterprise such as a teaching hospital, where products are produced simultaneously. For example, there is no objective way to divide the cost of conducting hospital rounds between patient care and teaching. For these reasons, data generated in cost-allocation studies are quite variable and not reproducible.

The *joint-products cost-allocation method* recognizes that patient care and education are produced simultaneously, and that most costs of a teaching institution are attributable to both of these products.<sup>9</sup> Expenditures are divided into joint costs, the costs of activities in which products are simultaneously produced, and pure costs of each product, that is, costs that are strictly assignable to that product. The pure cost of education in a teaching hospital is the hospital's current costs less the estimated costs of delivering the same amount of patient care without a teaching program.

Under the joint-products cost method, the question of how to apportion the cost of rounds between patient care and resident teaching is abandoned as unanswerable. Instead, the analysis focuses on how the cost of rounds will be affected by changes in the number of patients being given care or by changes in the number of residents being taught.

As the joint-products cost method deals with hypothetical situations, it is not empirical. Results are highly dependent on the assumptions made by the analyst.

Whichever method is used, it must be recognized that residency programs are rarely independent businesses with

their own accounting systems. They may be constituted as a department in a medical school, a cost center within a hospital, or as a freestanding nonprofit corporate practice. The activities of residency programs often occur at the intersection of several institutions. Residency finances may be accounted for not only by a hospital, but also by the medical school, its clinic, and, increasingly, a faculty practice plan as well.

Two surveys of US family practice residencies show that residencies take many different forms. One survey found that only 21% of the programs were operated as a hospital cost center.<sup>10</sup> The second survey found that most (59.5%) residencies were a hospital cost center.<sup>11</sup> This difference may reflect sampling bias or differences in study methods, or it may genuinely reflect that more family practice programs have become hospital based to realize the Medicare payment for graduate medical education.

## PREVIOUS COST-ALLOCATION STUDIES

Using the cost-allocation method, the two surveys of family practice residencies found that program expenses can be roughly divided into three equal parts: the cost of resident stipends, the cost of faculty salaries, and the cost of operating the family practice center and program administrative office.

The first study found that patient care income and hospital support provided 66% of residency revenues.<sup>10</sup> These sources provided only 43% of the support of the programs in the second study.<sup>11</sup> The remainder of program support came from state funds, federal and private grants, and other sources of nonpatient care income. Another cost-allocation analysis of a single program estimated that patient care income could meet no more than one half of program expenses.<sup>12</sup>

These studies suggest that patient income plays a smaller role in supporting family practice residency programs than it does in residency programs in other specialties. The Council of Teaching Hospitals reports that the average member hospital pays 81% of the cost of residency stipends from patient care income.<sup>13</sup>

There is limited evidence that the expense of training in the outpatient setting is what makes self-sufficiency so problematic. One family practice residency found that its clinic met only 68% of its costs from patient care revenue.<sup>14</sup> A study of two internal medicine residency clinics found that resident-generated patient service revenues paid just 77% of costs.<sup>15</sup>

## COST-ALLOCATION DATA IN EIGHT CALIFORNIA PROGRAMS

Hospital cost reports were used to evaluate the finances of family practice residencies at eight California public hos-



**TABLE 1. HOSPITAL-ADMINISTERED EDUCATIONAL EXPENSES AVERAGE AMONG EIGHT PROGRAMS (dollars per resident) 1984-85 FISCAL YEAR**

Expenses	Medicare Cost Report Data			Hospital Disclosure Report Data		
	Average	Standard Deviation	Range	Average	Standard Deviation	Range
Salaries	29,957	± 11,518	21,403-44,802	27,840	± 19,468	24-58,880
Other	22,822	± 20,094	5,420-58,987	714	± 634	0- 1,655
Subtotal, direct costs	52,779	± 12,714	38,882-69,706	28,525	± 19,795	253-60,429
Capital costs	634	± 743	0- 1,913	1,180	± 2,708	0- 7,821
Administration, personnel, cafeteria	13,477	± 8,338	4,845-30,691	3,281	± 1,334	976- 5,024
Operation of physical plant	3,351	± 4,252	278-10,516	1,236	± 2,360	0- 6,984
Laundry	26	± 40	0- 97	17	± 33	0- 88
Housekeeping	1,544	± 1,799	0- 5,255	838	± 1,588	0- 4,696
Subtotal, indirect costs	19,031	± 11,897	8,309-45,174	6,552	± 5,066	2,934-15,732
Total education costs	71,810	± 18,007	54,865-94,889	35,077	± 22,610	3,187-66,562
Patient care services by residents and faculty		*		20,867	± 26,182	5,559-81,749
Total operating expense of educational cost center		*		55,944	± 23,399	46,837-84,936
Number of residents allowed by report methodology	26.9			28.6		

\* These data not given in Medicare cost reports.

pitals. These programs were studied because they were located in hospitals with a single family practice residency, allowing all graduate medical education expense and revenue to be attributed to family physician training. The focus was on public hospitals because they are the training sites for most California family practice residents.

Two different reports were studied, the hospital Medicare cost report, and the California Annual Hospital Disclosure Report, a separate cost report required by state law.

### Expenses

The two different cost reports give remarkably different views of the cost of family physician training, even though they report information on the same eight hospitals for the same fiscal year (Table 1). One reason the average cost per resident is greater in the Medicare report is that Medicare rules exclude some of the residents who are counted in the state report. Moreover, resident and faculty time that is attributed to education in the Medicare report is assigned to patient care activities in the state disclosure report. Finally, the reports use a different method to assign the overhead of other departments to education.

The nearly twofold difference in gross education cost given by the reports demonstrates the arbitrary nature of the cost allocation method of analysis. Hospital cost reports also exclude the contribution that entities outside the

hospital make to family practice training, including the medical school, faculty practice plans, and hospital and residency foundations.

### Revenues

The hospital cost reports showed that the study hospitals administered an average of \$5,190 per resident in educational grants and received an average of \$20,444 per resident in education reimbursement from Medicare (Table 2). The latter figure understates the importance of Medicare education payments to hospital-based family practice residencies. The average California hospital with a family practice residency had more intensive teaching activity and greater utilization by Medicare patients, and would receive a larger Medicare education payment as a result.

Nationally, the Medicare program made \$1.381 billion in payments for medical education during fiscal 1985 (excluding New York and New Jersey).<sup>16</sup> This figure represents an average payment of about \$25,400 per resident.

The physician services income earned by a residency is not stated in the hospital cost report. All hospital revenue, including that earned by residents and staff physicians, is attributed to patient care departments, and none is attributed to the education cost center. Other hospital financial records may tabulate some of the revenue attributable to services rendered by residents and staff physicians, but



**TABLE 2. HOSPITAL-ADMINISTERED EDUCATIONAL REVENUES AVERAGE AMONG EIGHT PROGRAMS (dollars per resident) 1984-85 FISCAL YEAR**

Revenue Source	Average	Standard Deviation	Range
Medicare educational reimbursement*			
Indirect costs	8,317	2,725	4,865-12,902
Direct part A	10,541	4,857	6,773-21,869
Direct part B	1,586	1,583	0- 4,794
Total payment	20,444	7,285	13,472-35,668
Educational grants†	5,190	5,056	0-15,783

\* Data from Medicare cost reports  
 † Data from California hospital financial disclosure reports

revenues attributable to the residency are difficult to identify. For example, Medi-Cal (California's Medicaid program) does not directly pay for inpatient services rendered by residents, but instead pays a higher daily rate to teaching hospitals. Another example of the difficulty in determining revenue earned by the residency is the problem of deciding what share of physician service income earned in specialty services should accrue to the efforts of residents on rotation.

Thus it is difficult to use cost-report data to state the extent to which the study hospitals relied on external subsidy to meet the cost of education. These data do show that grants and Medicare payments met 35.7% of the graduate medical education expenses reported to Medicare. Joint-products cost analysis is a more useful tool to determine the net cost that medical education programs represent to hospitals.

**PREVIOUS JOINT-PRODUCTS COST STUDIES**

Most studies employing joint-products cost methods have evaluated the pure cost of education. This method has not been used previously to study family practice programs.

In Freymann's classic joint-products cost study, elimination of medical education would have caused a negligible reduction in the net return of a large community teaching hospital.<sup>17</sup> This calculation balanced the savings that result from termination of the education program with the expense of hiring replacement physicians and the loss of educational grants and fees. In this case, the pure cost of education was a small, negative figure.

The pure cost of educating internal medicine residents in a university outpatient clinic was calculated by estimating the cost of providing the same amount of patient care with fully trained internists instead of residents.<sup>18</sup> The study found that there would be a 4.6% reduction in cost, mean-

**TABLE 3. ESTIMATE OF PURE COSTS OF GRADUATE MEDICAL EDUCATION IN A FAMILY PRACTICE RESIDENCY WITH 18 RESIDENTS, FISCAL YEAR 1984-85**

Variables	Estimated Cost (in dollars)
Change in expenses	
Nonphysician staff, expenses	77,032
Resident stipends and benefits	655,648
Ancillary cost reductions	85,180
Replacement physician salary	(438,000)
Replacement physician benefits	(115,146)
Net savings	316,329
Change in revenues	
Medicare education reimbursement	(363,365)
State and federal grants	(208,252)
Reduced ancillary revenues	( 24,246)
Fee for service physician reimbursement	136,000
Net loss of revenue	(459,863)
Change in hospital net return (pure cost of graduate medical education)	(143,534)
Pure cost of education if hospital had not received educational subsidies	428,083

ing that 4.6% of clinic expenses consisted of the pure cost of teaching.

**JOINT-PRODUCTS COST ANALYSIS IN ONE CALIFORNIA PROGRAM**

A joint-products cost analysis was applied to one of the study hospitals, the Natividad Medical Center, in Salinas, California, a 200-bed public hospital with 18 family practice residents and no other graduate medical education program. The pure costs of education were calculated by estimating the effect of elimination of the residency, while keeping the amount of patient care constant.

Table 3 shows that the elimination of the residency program would decrease the hospital's net return by \$143,534. This decrease is less than 1% of the hospital's budget. The pure cost of family practice training at this hospital was negative, for although expenses could be reduced by substituting fully trained physicians for residents, this reduction would be more than offset by the loss of income from Medicare and residency grants.

If these special sources of income did not exist, the hospital would increase its net return by \$428,083 by eliminating the residency. Without the Medicare reimbursement and grants, the pure cost of education would be substantial.

This analysis is highly dependent on assumptions that must be made. The most difficult of these assumptions is in estimating the relative productivity of residents and the



staff physicians who might replace them. The Graduate Medical Education National Advisory Committee estimated that resident physicians provide 35% of the care given by fully trained physicians.<sup>19</sup> While it may seem unreasonable that three residents, each working 70 to 90 hours a week, are only as productive as a single fully trained physician working 50 hours a week, this ratio was accepted because of the concomitant increase in the productivity of the physicians who now spend much of their time in teaching and administering the residency program.

It was also assumed that after elimination of the residency, the faculty physicians could be retained at the same rate of pay. This assumption may not be true because it is possible the presence of the educational program has allowed the hospital to recruit and retain higher caliber physicians at lower pay.

The literature is replete with case-mix controlled estimates of the higher costs of teaching hospitals.<sup>20,21</sup> With such studies in mind, it was estimated that the substitution of fully trained physicians would reduce laboratory orders by 10% and the use of radiology and pharmacy by 5%. Reduced utilization of ancillary services was assumed to cause a proportionate reduction in the variable costs, such as supplies, materials, and temporary and contract services, but no reduction in the fixed costs of capital, equipment, and full-time staff. Projected savings were \$85,180.

The cut in ancillary orders would cause a \$24,246 decrease in hospital revenue. This amount is the reduction in reimbursement for the care of the 18% of the hospital's patients who were sponsored by a fee-for-service payer.

Revenues would increase by \$136,000 because replacement physicians would bill payers that do not pay for inpatient services provided by residents. This figure is based on an estimate that revenues for inpatient physician services would increase by 20%.

The replacement cost calculation ignores any long-term effect that elimination of the teaching program would have on the hospital's ability to attract patients. There would be an impact, however; residency graduates are responsible for 14% of the hospital's admissions.

The analysis assumes that none of the patient care services has a strictly educational component. The hospital studied is a county facility that largely serves patients who either receive Medicaid or are unsponsored. For this reason, it was assumed that the county would continue to operate an outpatient clinic in lieu of the family practice clinic. In other programs, the mission of the residency clinic may be entirely educational. For such programs, clinic revenues and expenses would be deducted to arrive at the pure costs of education. Since teaching clinics are frequently operated at a net loss, the pure costs of education would be increased.

This pure cost calculation confirms two hypotheses. First, family practice residency training at this hospital requires substantial subsidy. Second, external subsidies to education make the residency program a cost-effective way for a public hospital to provide physician services to medically indigent patients.

## CONCLUSIONS

Health care expenses in the United States now consume 11% of the gross national product. Many believe that these costs are excessive because of overutilization of diagnostic and therapeutic procedures and because of overreliance on subspecialty physicians.

Too little is known about the cost of medical education. More rigorous studies, including joint-products cost analyses, may prove useful.

The reduction in federal grants for family practice and cuts in some state programs have meant that many family practice residencies will need to generate more patient care revenue if they are to survive. Programs located in public hospitals, serving patients who are largely without health insurance, are finding it difficult to increase physician service income. These programs will need to justify themselves as the most cost-effective way for their hospitals to provide physician services to the indigent.

The promise of family practice is to deliver cost-effective medical care. The cost efficiency of ambulatory-oriented specialties results in one of the most striking ironies of medical education. Family practice residency programs cannot expand because they are not self-sufficient, in essence, because they are not costly enough to third-party payers. More research is needed to demonstrate to health care payers that it is in their self-interest to provide greater support for primary care training.

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