Balance and Limits: Modeling Graduate Medical Education Reform Based on Recommendations of the Council on Graduate Medical Education

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THE CURRENT EPOCH OF HEALTH CARE REFORM HAS stimulated an exhaustive dissection of our health care delivery system. This examination has brought renewed interest to the area of physician education and training—a domain of public policy marked by a perplexing combination of success and frustration. Undergraduate and graduate medical education (GME) today annually channels more than twice as many physicians into practice as was the case two decades ago (U.S. Department of Health and Human Services 1992). A growing preponderance of these graduates enters specialist rather than generalist practice (Colwill 1992). This specialty distribution has contributed to a complement of practicing physicians that has had only a minor impact on the chronic problems of underservice in poor and rural areas of the country (Ginzberg 1994). Moreover, evidence is accumulating that the markedly increased number of specialized practitioners in the United

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States is linked to the rapid escalation in the cost of health care (Grumbach and Lee 1991; Greenfield et al. 1992; Schroeder and Sandy 1993).

Various national commissions, medical philanthropies, scholars, and policy analysts have concluded that the key to improved health care access and cost containment is a physician workforce built on a generalist foundation (Beeson 1991; Mullan 1992; Council on Graduate Medical Education 1992; Physician Payment Review Commission 1993; Josiah Macy Jr. Foundation 1993; Pew Health Professions Commission 1993). Indeed, the President's Health Care Reform Task Force reached the same conclusion and has proposed legislation designed to stimulate generalist training and limit specialist positions.[1] The proposals emanating from these groups vary, but all agree that there should be a national system to allocate a specific and limited number of graduate medical education positions. Taking the lead in creating this system was the Council on Graduate Medical Education (COGME), established by Congress in 1986 to recommend appropriate federal and private sector efforts to address GME and physician workforce needs. COGME recommended that the nation limit training positions to 110 percent of the graduates of U.S. allopathic and osteopathic medical schools (as opposed to the current 135 percent) and that the system graduate 50 percent of its participants into primary care practice (Council on Graduate Medical Education 1992).

What effect would this proposal—which has come to be known as "50/50–110"—have on the shape of graduate medical education in the United States? To answer this question, it is necessary to map and describe quantitatively the current system, its specialty configuration and output, and compare the result with a system reconfigured along the lines of 50/50–110.

In carrying out this mapping, we referred to the Bureau of Health Professions (BHPr) Physician Supply Forecasting Model and used its GME component, which relies on estimates of the ultimate specialties selected by graduates when they complete GME. It then uses empirical and historical information to trace these specialists through their training period. This "backcasting" produces a profile of the residency training patterns of a typical cohort of medical school graduates. Given certain parameters, such as size of graduating class and ultimate specialty choice, the model maps the intervening residency years. The parameters

[1] The Health Security Act: Workforce Priorities under Federal Payment: Title III, Subtitle A, October 27, 1993.

can be adjusted to reflect the expected specialty choices of present and future medical school graduates under the prevailing system, as well as those resulting from the application of specific policy options like 50/50–110.

This is an exploratory analysis based on two sets of assumptions: one for the current production of the GME system and one for GME production under the COGME option. The actual shape and impact of any new system would largely depend on the details of implementation. This exercise is intended to provide a preliminary comparison of the 50/50–110 proposal with the current situation.

Methods

Aggregate Supply Forecasts

The full BHPr Physician Supply Forecasting Model was used to provide estimates of the aggregate future physician supply, first under current conditions based upon historical trends with no imposed restrictions on the number of residents and then under the 110 percent output recommendation (U.S. Department of Health and Human Services 1988). The results of these two scenarios were compared to determine the magnitude of future reductions in supply under the COGME option.

Under the current scenario, it is assumed that first-year osteopathic and allopathic enrollments will reach and stabilize at 19,600 by 1996, resulting in 18,000 graduates each year after 2000. The forecast of an annual net of 4,800 international medical graduates (IMGs) entering the physician supply is based on recent trends in the master file of the American Medical Association (AMA). Under the 110 percent scenario, first-year positions would be set at 19,300, based on the 17,500 MD and DO graduates anticipated in 1995 plus 10 percent, and held constant throughout the projection period.

GME Specialty Production

The GME component of the BHPr supply model was used to estimate future GME specialty production under current conditions compared with production under the COGME option. This model, as noted, uses

historically derived training pathways to determine the yearly GME specialty distribution of a given graduating class. In performing this comparison, all specialties were clustered into eight categories (see table 1):

1. generalists (i.e., three-year family practice, general pediatrics, and general internal medicine graduates)
2. medical subspecialties
3. pediatric subspecialties
4. general surgery
5. other surgical specialties and subspecialties
6. adult and child psychiatry
7. general preventive medicine/public health/occupational medicine/aerospace medicine (GPM/PH/OM/AM)
8. other specialties (hospital support specialties, dermatology and neurology)

Certain necessary assumptions and adjustments were made to simplify the branching and switching patterns that naturally occur in the GME system (see tables 2 and 3). These assumptions primarily dealt with the flow of residents from the first-year residency categories of preliminary internal medicine, transitional positions, and preliminary surgery to their ultimate specialty residency program. It should be emphasized that the forecasts for the fifth postgraduate year (PGY-5) in this model do not attempt to account for residents who drop out of programs prior to completion of the training requirements for board eligibility.

The current conditions scenario models the "class" of residents starting GME in 1992–93, which numbers approximately 24,000 allopathic and osteopathic graduates (Association of American Medical Colleges 1993; American Osteopathic Association 1993). About 6,000 of these individuals are international medical graduates (IMGs), some 80 percent of whom will eventually enter the permanent U.S. physician workforce (U.S. Department of Health and Human Services 1988; Martini and Grenholm 1993). It is estimated that approximately 600 of the 1,600 osteopathic graduates will enter allopathic residencies, and the remaining 1,000 will enter osteopathic postgraduate training programs.

An examination of the results of a recent graduation questionnaire circulated by the Association of American Medical Colleges (AAMC) and of the actual career selection patterns of the 1987, 1988, and 1989 grad-

TABLE 1
Specialty Clusters

Generalists	
General/family practice	
General internal medicine	
General pediatrics	
Internal medicine and pediatrics primary care	
Internal medicine subspecialties[a]	
Cardiovascular disease	
Gastroenterology	
Pulmonary diseases	
Endocrinology	
Others	
Pediatrics subspecialties[b]	
Pediatric cardiology	
Others	
General surgery	
Other surgery: surgical subspecialties and the following surgical specialties	
Colon and rectal surgery	Otolaryngology
Neurological surgery	Plastic surgery
Obstetrics and gynecology	Thoracic surgery
Ophthalmology	Urological surgery
Orthopedic surgery	
Psychiatry and child psychiatry	
Preventive medicine and public health	
Aerospace	
Occupational medicine	
Hospital support and other specialties	
Allergy and immunology	Nuclear medicine
Anesthesiology	Physical medicine and rehabilitation
Dermatology	Pathology—anatomic/clinical
Diagnostic radiology	Radiology
Emergency medicine	Radiation oncology
Forensic pathology	"Other specialty"
Internal medicine—preliminary	"Unspecified"
Neurology	

[a] Excluding general internal medicine.
[b] Excluding general pediatrics.

uating classes (Council on Graduate Medical Education 1994) suggests that approximately 30 percent of all 1992–93 graduates are likely to practice as generalists. Once the generalist output has been adjusted to this level, the model then distributes the remaining 70 percent among the other specialty categories based on historical output and then backcasts this total output to trace the pathways in earlier years, thereby producing a specialty distribution of first-year residents.

The COGME scenario calls for one-half of the 19,000 first-year postgraduate (PGY-1) residents (or 9,500) to graduate into generalist practice. Of the various generalist configurations that the model could use to arrive at the 9,500, the one that was chosen assumes a reduction in general internal medicine subspecialization from the current 50 percent to 25 percent and a reduction of subspecialization in general pediatrics from the current 25 percent to 15 percent. Family practice is derived using the current retention rate of about 90 percent. In addition, consistent with COGME recommendations, general surgery, psychiatry (including child), and GPM/PH/OM/AM were held at constant numbers (Council on Graduate Medical Education 1992). Given this 50 percent generalist output, the model distributes the remaining 50 percent for PGY-5, less the specialties held constant, based on historical output, and then backcasts to produce the PGY-1 distribution.

Results

The long-term impact of the 50/50–110 scenario on the future size of the physician workforce would be to reduce the total physician supply by about 90,000 to 790,000, or 9 percent below projected levels in 2020. The nation's physician-to-population ratio would remain at the 1990 level of about 240 per 100,000 in 2020, 11 percent below the projected rate of 270 per 100,000 (fig. 1).

The immediate effects on GME of the 50/50–110 scenario would be to decrease first-year residents by about 5,000, from 24,000 to 19,000 (tables 2 and 3). Ultimately, the number of residents in the system would decrease from its current level of about 100,000 to about 75,000. The effect on the GME specialty distribution would be to produce about 2,400 more generalists than the current level, estimated to be 7,100; approximately 900 more first-year generalist slots would still be required.

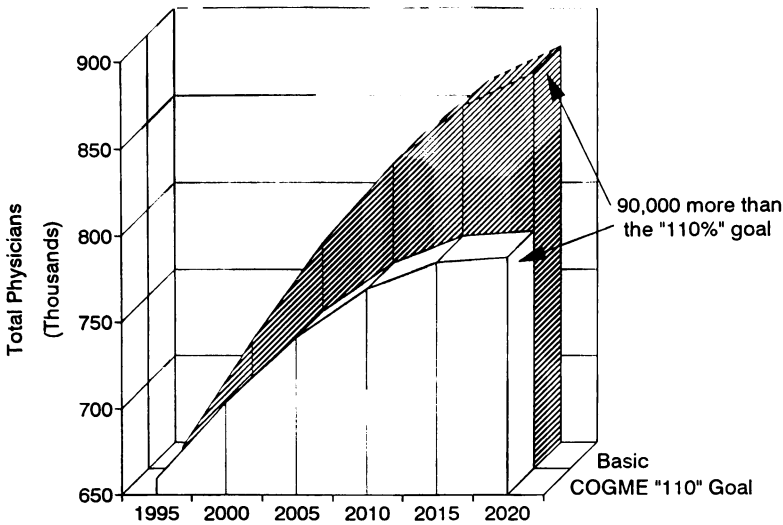

FIG. 1. Total physicians: basic trend and "110 percent" scenario of the Council on Graduate Medical Education.

In this modeling exercise, the 5,000 net reduction in slots and the increase of 2,400 in generalist slots were deducted equitably from the remaining specialties while holding a few specialties constant.

Under the assumptions in this modeling exercise, the 50 percent generalist requirement, coupled with the "hold constant" assumption, would reduce the "hospital support and other" specialty share to about 15 percent from a current 26 percent and the surgical specialties and subspecialties to about 11 percent from a 20 percent share. More than 40 percent of the generalists would be general internists, reducing the internal medicine subspecialty share to almost 7 percent from nearly 12 percent. In this model, almost 75 percent of residents initiating internal medicine residencies would enter generalist practice, up from about 50 percent. Family medicine's share of residents would rise to nearly 18 percent from the current 10 percent level.

The exercise produces significant reductions—over 2,700 slots—in the surgical specialties, or more than 55 percent, combined with "hospital support and other" specialty reductions that amount to nearly 3,200 slots, or about 52 percent. The internal medicine subspecialties also would sustain a 50 percent reduction of 1,400 slots (table 4).

This analysis reflects only one possible GME transition scenario under

TABLE 2
Specialty Distribution of Residency Positions under the Current System[a]

Specialty name	1992–93 class		Percent of total
	PGY-1	PGY-5	
Primary care specialty	10,725	7,100	29.6
Family medicine	2,665	2,400	10.0
GIM[b]	5,800	3,000	12.5
IM subspecialty		2,800	11.7
Pediatrics	2,260	1,700	7.1
Pediatric subspecialty		560	2.3
GPM/PH/OM/AM	65	130	0.5
Psychiatry (including child)[c]	1,200	1,400	5.8
Surgery			
General surgery	1,000	1,000	4.2
Preliminary surgery	1,650	—	—
Surgical specialties	2,200	4,900[d]	20.4
Hospital support and other specialties	3,270	6,110[e]	25.5
Preliminary IM and transitional positions	3,890[f]	—	—
Total	24,000	24,000	100.0

[a] Thirty percent generalist output.
The calculations are based on the following assumptions:
[b] According to AAMC data, approximately 700 more residents enter GIM in PGY-1 and exit prior to PGY-3 than are accounted for by the sum of PGY-5 GIM and IM subspecialties. These 700 have been allocated to preliminary IM in PGY-1.
[c] PGY-1 to PGY-5 increases in psychiatry are a result of movement out of family practice between PGY-1 and PGY-5.
[d] PGY-5 surgical specialties (4,900) include both the PGY-1 preliminary surgery (1,650), the PGY-1 surgical specialties (2,200), and a flow of residents out of preliminary IM and transitional positions into the surgical specialties (1,050).
[e] PGY-5 hospital support and other specialties (6,110) include the remainder of preliminary IM and transitional (2,840 = 3,890 − 1,050) plus the PGY-1 hospital support and other specialties (3,270).
[f] The number for PGY-1 preliminary IM and transitional positions (3,890) was obtained by subtraction: 6,110 (hospital support and other specialties in PGY-5) + 4,900 (surgical specialties in PGY-5) − 2,200 (PGY-1 surgical specialties) − 1,650 (PGY-1 preliminary surgery) − 3,270 (PGY-1 hospital support and other specialties). This estimate was corroborated using AAMC data for transitional and preliminary categories.
Abbreviations: AAMC, Association of American Medical Schools; AM, aerospace medicine; IM, internal medicine; GIM, general internal medicine; GPM, general preventive medicine; OM, occupational medicine; PH, public health; PGY, postgraduate year.

the 50/50–110 option. When certain specialties held constant as indicated, reductions were confined to the subspecialty disciplines in medicine and surgery and the hospital support and other specialties. Disaggregation and specification of these reductions were not performed on a

TABLE 3
Specialty Distribution of Residency Positions under the 50/50–110 Policy Option[a]

Specialty name	1992–93 class		Percent of total
	PGY-1	PGY-5	
Primary care specialty	11,620	9,500	50.0
Family medicine	3,700	3,400	17.9
GIM	5,400	4,000	21.1
IM subspecialty		1,400	7.4
Pediatrics	2,520	2,100	11.1
Pediatric subspecialty		420	2.2
GPM/PH/OM/AM[b]	100	200	1.1
Psychiatry (including child)[c]	1,200	1,400	7.4
Surgery			
General surgery[c]	1,000	1,000	5.3
Preliminary surgery	340		
Surgical specialties	1,820	2,160[d]	11.4
Hospital support and other specialties	1,690	2,920[e]	15.4
Preliminary IM and transitional positions	1,230		
Total	19,000	19,000	100.0

[a] Fifty percent generalist and 50 percent specialist—capped at 110 percent.
The calculations are based on the following assumptions:
[b] Half of the residents completing training in GPM/PH/OM/AM entered this specialty in PGY-1.
[c] PGY-1 and PGY-5 psychiatry and general surgery are held constant at the 30 percent generalist scenario levels.
[d] PGY-5 surgical specialties (2,160) include preliminary surgery plus PGY-1 surgical specialties. Slots were prorated to PGY-1 preliminary surgery and surgical specialties based on the current distribution.
[e] PGY-5 hospital support and other specialties (2,920) include PGY-1 hospital support and other specialties and preliminary IM and transitional. PGY-1 slots were prorated based upon the current distribution.
Abbreviations: See table 2.

specialty-specific basis. Increases in the number of generalist positions could also have been distributed differently across the three disciplines.

Discussion

The 50/50–110 option would result in significant modifications in GME training. Medical and surgical subspecialty as well as hospital support

TABLE 4
Comparison of the Output Specialty Distribution[a]

Specialty name	PGY-5		Difference	Percent change
	Current	Option		
Primary care specialty	7,100	9,500	2,400	33.8
Family medicine	2,400	3,400	1,000	41.7
GIM	3,000	4,000	1,000	33.3
IM subspecialty	2,800	1,400	(1,400)	−50.0
Pediatrics	1,700	2,100	400	23.5
Pediatric subspecialty	560	420	(140)	−25.0
GPM/PH/OM/AM	130	200	70	53.8
Psychiatry (including child)	1,400	1,400	0	0.0
Surgery				
General surgery	1,000	1,000	0	0.0
Surgical specialties	4,900	2,160	(2,740)	−55.9
Hospital support and other specialties	6,110	2,920	(3,190)	−52.2
Total	24,000	19,000	(5,000)	−20.8

[a] Current system versus 50/50–110 policy option.
Abbreviations: See table 2.

and other specialty trainees would be cut approximately in half. The diminished number of positions in the surgical and support specialties would result in a larger pool of applicants for the PGY-1 positions in family medicine, pediatrics, and internal medicine. Significantly increased numbers of medical and pediatric residents would enter general practice after three years of training.

The decreases in residents would significantly affect delivery of services in many institutions, requiring a transition to the use of staff physicians, physician assistants, or advanced practice nurses to supplement the reduced resident workforce. The Physician Payment Review Commission, COGME, and the Health Security Act have called for transition funding to affected institutions to assist in residency downsizing. This support would mitigate the potential decrease in services caused by the loss of resident slots. A number of groups, including COGME, have proposed the establishment of consortia of medical schools and teaching hospitals to manage the transition by providing a base for consolidating and coordinating training positions and programs.

The 50/50–110 option would also result in a significant increase in family practice positions and the reorientation of much of the training in internal medicine toward generalist practice. Both of these developments would suggest the need for expanded training in ambulatory and community-based settings. Program, faculty, and site development requirements would be linked to these expansions.

The modeling described here presumes that all residents complete training. Some residents, of course, do not, and they enter the workforce without board eligibility. It is likely that a disproportionate number of these physicians do declare themselves (for AMA masterfile purposes) as generalists. Building this phenomenon into a modeling exercise for GME, however, would have the effect of lowering the requirements for generalist training positions and incorporating the presence of incomplete training into our training strategies (Kindig and Libby 1994). We have avoided doing this by presuming that all residents complete the training course on which they embark. It is difficult to determine the specialty of these non-board-eligible physicians because their AMA masterfile "specialties" are self-declared.

The forecasted need for generalist training positions depends upon the estimated percentage of graduates who ultimately practice as generalists. The 30 percent rate used here reflects the behavior of the most recent graduates. Estimates more optimistic than the 30 percent rate would reduce the PGY-5 gap between the current system and the 50/50–110 scenario (Kindig and Libby 1994). More pessimistic projections would produce a greater gap. In all events, the 50/50–110 PGY-5 requirements remain a fixed target.

GME reform is necessary, but not sufficient, to achieve a generalist-oriented reform in the workforce. To be permanently successful, however, such reform will have to be accompanied by changes in undergraduate medical education, student indebtedness, and physician reimbursement. Medical schools will need to incorporate a generalist ethos in their admission procedures, the skills required to foster such an outlook must be taught at the undergraduate level, and generalist faculty must be augmented. Scholarship, loan, and loan repayment funds will have to become preferentially available to students willing to undertake primary care careers. Most important, pay equity for primary care physicians must be built into the system, for, without it, physicians will surely gravitate toward subspecialty and procedural practices despite the best efforts of the education and training systems.

These ideas are all part of the current rich national debate on health care reform. Increasing the production of generalist physicians while downsizing GME as a means of containing the growth of physician supply has major advantages. The resultant workforce composition would facilitate provision of universal health care access (Schroeder 1984; Tarlov 1986; Whitcomb 1992; Weiner 1993) and help control costs (Eisenberg 1986; Grumbach and Lee 1991; Greenfield et al. 1992; Schroeder and Sandy 1993)—the basic tenets of health care reform.

The modeling of GME scenarios offers educators and policy makers the opportunity to weigh various options as they contemplate the important decisions that lie ahead. Managing the GME resources of the United States and modifying the linked elements of the workforce continuum must be part of the overall movement toward a better system of care for all Americans.

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