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GRADUATE MEDICAL EDUCATION:
What Are We Paying For?

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GRADUATE MEDICAL EDUCATION: WHAT ARE WE PAYING FOR?

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Executive Summary

After completing their undergraduate medical degrees, physicians undergo at least three years of graduate medical education (GME). This residency period, which varies by specialty, gives trainees clinical experience in their chosen specialty under physician supervision. Residency programs are either sponsored by or affiliated with hospitals where the bulk of clinical training occurs. Hospitals, medical schools, and other institutions involved in GME not only train physicians but also provide patient care, often to underserved or indigent populations, and, in many cases, conduct medical research. This combination of institutional missions creates both opportunities and challenges for designing, financing, and conducting effective graduate training programs. This report describes GME funding, characteristics of training programs and teaching hospitals, and, finally, characteristics of residents themselves. It is based on information from a variety of secondary sources and comments from leaders who participated in five site visits.

There are a number of costs associated with training residents in clinical settings, from the direct cost of their salaries and benefits through the indirect costs associated with their involvement in clinical care. These costs are paid through a complicated mix of explicit GME payments and implicit sources, including public and private payment for clinical services, research funds, and philanthropic and other funds.

Medicare is the largest single source of explicit funding for GME, paying teaching hospitals about $7.4 billion in FY2003, with Medicaid programs second at $2.5 billion (Wynn, 2006). Combined with spending by the Department of Defense, Veterans' Health Administration (VA), and other programs, total public spending on GME was about $11.5 billion. Private payers support GME indirectly through the higher payments they make to teaching hospitals. One analysis estimates that the magnitude of this funding stream is about $7.2 billion, just below Medicare's spending (Wynn, 2006).

Medicare makes two different types of GME payments. Direct graduate medical education (DGME) payments are designed to help cover the direct costs hospitals incur by having a training program, primarily resident salaries and benefits. These payments are based on a hospital-specific per-resident amount adjusted by Medicare's share of hospital inpatient days. Indirect medical education (IME) payments are designed to compensate for the higher costs associated with including trainees in clinical care. Medicare has established hospital-specific caps on the number of trainees it will support and it reduces its support by 50 percent for trainees who have passed their first board eligibility or have been in training for over five years, whichever comes first. Forty-eight Medicaid programs support GME, often through mechanisms fairly similar to Medicare's.

The complicated relationships and funding flows among GME partner organizations make it difficult to track the ultimate disposition of particular funding sources. Although any particular payment is made to a specific unit or organization, there are transfers of funds among hospitals, medical schools, faculty practice plans, and other entities for GME and related costs. The difficulty in accounting for the ultimate use of a particular funding stream is exacerbated by the fact that residents are always paid by their program's home institution but typically rotate

through several sites in the course of their training, many of which can claim Medicare support while they are on site. These same factors lead to different levels of understanding about GME funding among leaders within the same organization.

Based on comments by participants in site visits at five academic centers, leaders are aware of Medicare's central role in GME funding but many do not seem to be knowledgeable about specific aspects of these policies. Among most site participants, there was a general sense that Medicare DGME and IME payments combined are roughly comparable to the total cost of resident salaries, benefits, and other direct training costs, excluding attending physician salaries. Four of the five sites have exceeded their Medicare caps by a fair degree, indicating that they have been able to find ways to support residents who are not eligible for Medicare support through clinical income and other sources. These observations are consistent with data that show that specialties with training periods over five years long (so trainees will receive reduced Medicare support) account for a slightly larger share of residents now than they did several years ago. In other words, the reduced level of Medicare support after five years does not appear to have curtailed the relative growth of these specialties. The one site at which Medicare caps and per-resident amounts appear to play a more prominent role in the number and size of training programs is in a community with a chronic undersupply of physicians and has a persistently high share of indigent patients. In this resource-constrained environment, it appears more difficult for leaders to support GME beyond Medicare limits.

Most, but not all, residency programs are accredited by the Accreditation Council for Graduate Medical Education (ACGME). ACGME has a residency review committee (RRC) that reviews accreditation for each of 27 specialties and one for programs that provide a transitional year of general clinical training (ACGME, 2006). While accreditation is voluntary, programs must be accredited to receive Medicare funding for their residents. Some state licensure laws also require physicians to have completed an accredited residency program.

The numbers of residency programs and residents in the United States have grown fairly steadily since 1980, with program growth (80 percent) outstripping resident growth (65 percent). As a result, the number of residents per program has dropped slightly, from an average of 13.4 in 1980 to an average of 12.3 in 2004. In the 2005/2006 school year, there were 8,300 accredited and combined residency programs training 104,986 residents (ACGME, 2006).

General specialties account for the largest numbers of programs and residents. There are 1,878 programs in internal medicine and its subspecialties, of which 388 are in general internal medicine. Among the ten most popular fields, there have generally been only small changes in the number of programs offered since the 2001/2002 school year. The exception is neurology, in which there has been a 23 percent increase due to increases in subspecialty programs. Other significant increases have occurred in less common programs with eighteen specialties or subspecialties experiencing a change of at least 10 programs in the last five years.

The 2007 Medicare IPPS Impact File lists 1,098 hospitals reporting residents for the purposes of Medicare GME payments – about 30 percent of the hospitals in the United States. The number of residents per hospital varies widely, with 59 teaching hospitals reporting less than 1 full-time

resident, while 17 hospitals have 500 or more residents. Overall, teaching hospitals report an average of about 73 residents.

About one-fourth of teaching hospitals (8 percent of all hospitals) meet the ACGME's definition of "major teaching" hospital, based on the IPPS Impact File. In fact, over half (41,792) of the residents in the Medicare data are trained in the 134 hospitals that report at least half a resident for every bed. Major teaching hospitals are larger than other hospitals, with an average daily census of 297 patients. By comparison, hospitals with a lower teaching intensity have an average daily census of 179 patients, while those that do not train residents have an average daily census of just 66 patients.

Teaching hospitals see a different mix of patients from other hospitals, with a higher percentage of patients who are poor or uninsured and a lower share of Medicare patients. Teaching hospitals also have a higher average wage index, likely a reflection of the fact that they tend to be in large urban areas. Over half of teaching hospitals are non-profit, with church-owned the next most common ownership type (15 percent).

Training opportunities are not evenly distributed around the country, with almost half of all residency programs in the US located on the east coast. New York alone accounts for more than 13 percent of the programs in the country, more than any other single state. The ratio of resident physicians to the overall population is far higher in the northeast than in other regions. Massachusetts and New York have the highest ratio, with 72 and 76 trainees per 100,000 people, compared with under 4 per 100,000 in Idaho, Montana, and Alaska. The geographic distribution of residents is fairly similar across the largest specialties, with the exception of family medicine, which is relatively less common in the northeast than in other areas. Programs are more likely to be located in urban areas, with over three-quarters of residents trained in large urban areas and less than one percent in rural areas. Research and the experiences of site visit participants both suggest that the location of training is strongly associated with where physicians practice. As a result, many propose strategies for increasing training opportunities in rural areas as an essential element to improving physician supply in those areas.

The way that residents split their time among clinical care, didactic and other formal learning, and research differs across specialties, reflecting Residency Review Committee (RRC) requirements, board expectations, and the practice of medicine in different fields, in addition to local program decisions. Site visit participants' estimates of the share of time spent in clinical care ranged from 50 to 80 percent, with specialties like pathology at the lower end and internal medicine and pediatrics at the high end. Most site participants involved with oversight of one or more training program reported that they felt that resident educational needs drove most program changes. Program directors reported that, for the most part, they could reduce trainees' hospital rotation time, whether to participate in other educational activities or to rotate through a community setting, as appropriate to meet trainees' needs. Sites have clear processes in place to oversee residents' activities, monitor the quality of clinical oversight, and make changes in program design. Only among leaders at the most resource-constrained site was there a sense that it would be hard to make program changes that led to less support of the clinical needs of the hospital.

Informants felt that their residents were exposed to patients from a broad socio-economic spectrum and to a clinically challenging and appropriate case mix, whether via external rotations or at the home teaching hospital. The role of community-based, non-hospital training opportunities was described as modest in all sites, with family medicine programs consistently singled out as the exception where community training is extensive. Many felt that the weakest aspect of their programs is preparing residents for practice management, billing, and negotiating with payers.

The characteristics of residents have changed drastically since the late 1970s, reflecting broader societal trends in the demographics of students attending college and medical school. For example, 1977 about 15 percent of residents were female, compared to over 40 percent in 2004. Women now constitute more than half of residents in pediatrics and obstetrics and gynecology, but remain rare in orthopedic surgery.

During this period, the share of white residents fell from 80 percent to 55 percent. The main growth has been among Asian residents (from 10 percent to 25 percent), with the share of black residents remaining fairly steady at about 5 or 6 percent. Asian residents are disproportionately in internal medicine, psychiatry, radiology, and anesthesiology and relatively underrepresented in emergency medicine and orthopedic surgery. Black residents are relatively more common in obstetrics and gynecology and less common in radiology, anesthesiology, and orthopedic surgery.

The current 26 percent share of residents who are international medical graduates (IMGs) is almost the same as it was 25 years ago, although it has gone through a large swing during that period, reaching a low of 18 percent in 1988. In 2002, one-quarter of IMGs were US citizens and another quarter were permanent residents, although these may be low estimates given that citizenship/visa status was unknown for another quarter of IMGs. IMGs are relatively more likely to enter internal medicine, psychiatry, and family medicine programs and less likely to choose radiology, emergency medicine, and orthopedic surgery.

As reflected by the number of applicants for available residencies by specialty, general and plastic surgery are currently the two most popular specialties among medical school graduates, with both having more than two applicants per available residency in 2005. Family medicine and combined internal medicine/pediatrics programs both had fewer applicants than positions. Although they attract fewer residents per available position, primary care residency programs remain the largest programs. However, other programs, such as anesthesiology, radiology (diagnostic) and emergency medicine are growing much faster than these historically large programs.

The average 2005/2006 salary for residents ranged from $41,900 for residents in the first year of training to $49,916 in the sixth year. There is some regional variation in pay for residents, with salaries higher in the northeast and lower in the south. Similarly, pay levels vary with hospital ownership, with the VA reporting relatively high values. Most site visit participants reported that they set resident salaries based on market factors, not their Medicare per-resident amount. In fact, several sites are part of training consortiums that establish a single salary structure for trainees in programs based at several institutions, each of which has a different per-resident

amount. Residents reported that salary differences among programs did not play an important role in their decisionmaking process – they assumed that programs offered a living wage and none expected to be saving during their residencies.

All site visit participants were asked to share their overall impressions of the GME system in the United States and any thoughts they had for improving it. Many responded that, while it could stand improvement, the U.S. approach was the "best in the world" by stressing clinical experience instead of didactic and other traditional classroom learning experiences, as are common in other systems. Some of the ideas raised by several different respondents include:

- minimize the extent to which residents are considered subsidized hospital labor and reinforce that they are still in training, without reducing their clinical experiences;
- create more support, both financial and professional, for clinician educators; and
- create an all payer system for supporting GME.

Most expressed skepticism that major GME reform could happen within the current complicated insurance and care systems. The complex network of overlapping connections among GME partners reflect a delicate equilibrium within the current system of public and private provision and payment for health services in the US, so any change in GME could have extensive ripple effects throughout the system.

Section 1. Background

Medical education in the United States consists of two distinct phases: medical school training, which culminates in receipt of MD degree, and graduate training (also known as graduate medical education or GME), which occurs in clinical settings and leads to licensure and board eligibility. This practical training is a complicated enterprise that takes place in a broad array of settings, from large academic medical centers to small community clinics. These various institutions not only train physicians but also provide patient care, often to underserved or indigent populations, and, in many cases, conduct medical research. This combination of institutional missions creates both opportunities and challenges for designing, financing, and conducting effective graduate training programs.

During their graduate training, resident physicians receive additional education and provide direct patient care with oversight from physician supervisors. They may also participate in research activities. To gain initial board certification in a specialty generally requires three to five years of this supervised practice and training. If they so desire, physicians may then pursue additional training in a subspecialty of their field. As articulated by the Accreditation Council for Graduate Medical Education (ACGME), residents are expected to gain competence in six areas (ACGME, 2003):

> **Patient care** that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health;
>
> **Medical knowledge** about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to patient care;
>
> **Practice-based learning** and improvement that involves investigation and evaluation of their own patient care, appraisal, and assimilation of scientific evidence, and improvements in patient care;
>
> **Interpersonal and communication skills** that result in effective information exchange and teaming with patients, their families, and other health professionals;
>
> **Professionalism**, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population; and
>
> **Systems-based practice**, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system for health care and the ability to effectively call on system resources to provide care that is of optimal value.

There are several different models of how teaching hospitals, medical schools, and residents can be organized to provide this training. Every residency program in the United States, though,

must have a sponsoring organization – the institution that is ultimately responsible for the design and administration of the program. This sponsoring organization takes care of the personnel management aspects of having residents on site, such as selecting residents, paying salaries, managing benefits, and maintaining work and vacation schedules. In some cases, this office is also where academic or medical leadership of training programs are also located. Sponsoring organizations may sponsor one or many programs – training for each specialty is considered a separate program at that institution.

Sponsorship of residency programs is not limited to one particular type of entity. We visited five graduate medical education sites for this project, and among them there were three general organizational models. The sponsoring organization was either within a hospital or hospital system, within a medical school/university, or external to both (such as a consortium that coordinated among many organizations). In each arrangement, there was a "GME office" within the sponsor's organization that serves as the administrative center for residents and program directors.

In addition to handling personnel issues related to residents, in most cases the sponsoring organization is responsible for arrangements with external institutions associated with training residents in programs based in this home institution. Trainees generally go through a series of rotations at multiple locations -- either within the same institution or across different institutions. There is usually a signed agreement in place with each organization that provides training opportunities that details the number of trainees, time of training, and any associated financial arrangements. Even if the sponsoring institution is a hospital, it may have arrangements with other hospitals that participate in its residency programs. Likewise, some hospitals participate in more than one institution's training programs.

Most, but not all, residency programs are accredited by the Accreditation Council for Graduate Medical Education (ACGME). ACGME has a residency review committee (RRC) for each of 27 specialties and one for programs that provide a transitional year of general clinical training (ACGME, 2006). These RRCs are responsible for reviewing the accreditation of each program. While accreditation is voluntary, programs must be accredited to receive Medicare funding for their residents. Some state licensure laws also require physicians to have completed an accredited residency program.

Residency programs and the RRCs are also influenced by the requirements for board certification in each specialty. The American Board of Medical Specialties is comprised of 24 boards that set the requirements for certification in each specialty, including the minimum number of years of training that residents must complete before they can take the board examination. Nearly 90 percent of U.S. physicians are board certified (Mallon, 2004).

By any measure, training physicians to practice in our increasingly complex medical care system is an expensive undertaking. Our GME system now has over 100,000 residents and clinical fellows receiving training in a given year, one quarter of whom are graduates of foreign medical schools. The total costs of providing this training, including paying salaries to physician trainees, was estimated to be $18.7 billion in 2003 (Wynn, 2006). Thus, a conservative estimate of the cost is nearly $180,000 per year per trainee. This includes resident salaries that are

typically between $40,000 and $50,000 per year (AAMC, 2005) as well as the cost of benefits and indirect costs such as the salaries of attending physicians, the higher cost of patient care in a teaching environment, and program administration. When all years of post-graduate training are considered, spending may range from $500,000 to $1 million per physician.

Myriad funding sources support graduate medical education, so the full picture of expenses and funding must be pieced together from many different sources. Medicare is the largest payer for GME, contributing over $7 billion per year in payments for both direct costs such as residents' salaries as well as the indirect costs that teaching sites incur. Most states also support GME through their Medicaid program, which in turn brings in additional federal money through the federal match. Other federal funding for medical education is provided through the teaching that takes place at federal facilities that are part of the Veterans' Health Administration (VA) and the Department of Defense (DoD) and through multiple programs at the Health Resources and Services Administration (HRSA). Other government sources – such as state and local governments -- also contribute to teaching costs, but in much lower amounts. Private payers may implicitly pay for GME by paying teaching hospitals more for the care they provide. Public and private funding for medical research at teaching institutions also plays an important role in supporting salaries for teaching staff and for some residents. Private philanthropy is yet another source that funds activities at many institutions.

Many argue that graduate medical education is a classic example of a public good, whose production benefits society as a whole but which individual actors, acting in their own self interest, have little incentive to finance.[1] This public good argument is the rationale generally given for having government involvement in GME financing. Most debate over government's role has focused on defining an appropriate role for the Medicare program. Ironically, although Medicare has treated GME expenses as allowable (reimbursable) costs almost since the program's inception, Medicare's payments for GME were intended to be a temporary measure, in effect only until policy makers could establish a permanent funding source for medical education (Anderson et al., 2001). However, these payments became an established part of the program, and were incorporated into the inpatient prospective payment system (IPPS) for hospitals when it was implemented. The Physician Payment Review Commission (PPRC, 1997) described several possible rationales for Medicare's ongoing support of GME, namely that the program seeks to protect the viability of teaching hospitals, provide beneficiaries access to care provided by these facilities, and ensure an appropriate supply of physicians to care for beneficiaries.

In the mid-to-late 1990s, a number of commissions and other observers advanced proposals for reforming the GME financing system, including radical changes to Medicare's role. One concept that gained support from many corners – including the Council on Graduate Medical Education (COGME), the Pew Health Professions Commission, the Commonwealth Fund's Taskforce on Academic Health Centers, and several members of Congress – was the creation of

[1] Opponents of the view of GME as a public good argue that residents and fellows willingly undertake training and accept low salaries and long work hours in exchange for the much higher income expected after completion of the training, and that training institutions willingly engage in GME because these residents provide an inexpensive labor pool that produces more in patient revenue than the costs involved in training. Therefore, in this view, the market will work without government intervention and without government subsidies.

an 'all-payer' fund to support GME (COGME, 2000; Pew Commission, 1998). As envisioned by these proponents, this fund would be financed not only by contributions from Medicare and Medicaid but from all other third-party payers, as well. The National Bipartisan Commission on the Future of Medicare (1999) also espoused the concept of a single GME fund to finance direct medical education expenses. They described two options for such a fund: discretionary funding through the annual federal appropriations process, or a mandatory entitlement program.

The Medicare Payment Advisory Commission (MedPAC, 1999, 2000) took a different tack when it considered GME financing, rejecting the concept of GME as a public good. The Commission recommended that Medicare's payment adjustment to teaching hospitals account only for the higher patient care costs in teaching hospitals. The Commission also stated that other policy goals – such as affecting the size and specialty mix or geographic distribution of the national physician workforce – should be pursued through means other than Medicare GME financing. Other reform options that have been floated include reducing or eliminating the training subsidies for international medical graduates (IMGs), imposing residency slot quotas, changing the relative subsidization provided to primary care vs. specialty residents, and developing a more explicit mechanism for funding the provision of uncompensated care (CBO, 1995).

Medicare payments have presumably made hospitals more receptive to having residents on site, providing the clinical experiences that trainees need. Some observers have raised the concern that these payments may sometimes thwart training, by subsidizing highly-trained staff for hospitals. As a result, hospitals may under invest in other clinical personnel, such as physician assistants, therefore shifting clinical responsibilities to residents that may not be consistent with their educational needs. This intermingling of hospitals' clinical demands and trainees' needs has complicated discussions of GME funding reform and leads to discussions of GME in other contexts, such as how to shore up financially strapped safety net hospitals that are also training hospitals.

Given the large amounts of money at stake, and the number of diverse and vested interests, developing consensus around desired changes and mustering the political will to make these changes has proven to be quite challenging. Academic medical centers, in particular, stand to lose significant funds if the Medicare GME payment system is modified, and they have historically been very vocal about the threat this would pose to their missions, including the significant amount of uncompensated care provided by many of these institutions. Although it has been several years since these proposals were advanced and actively debated, continued financial pressure in the Medicare program, coupled with ongoing interest in efficiently developing a medical workforce that can meet our nation's needs, makes it likely that this issue will resurface, particularly as broader Medicare reform is discussed.

It is in this policy context that we have sought out available national data resources to describe many aspects of the GME enterprise. We have augmented these data with more in-depth contextual information derived from site visits to several training settings. This synthesis of available secondary data with observations of leaders in the field is designed to provide a clearer picture of the current state of GME in the United States – including a more explicit

understanding of what we are producing, how we are producing it, what it costs, and who is paying for it.

We address the following questions in this report:

1. **How is graduate medical education funded?** How much do different payers and sources contribute? What payment mechanisms are used by non-Medicare payers? How do the leaders of teaching programs view the flow of money into and through their institutions?

2. **What do U.S residency programs and teaching hospitals look like?** How many training programs exist? How many residents are they training? What is the average size of a training program? Where are these programs based (e.g., academic medical center, community hospital, non-hospital setting)? Are these institutions publicly or privately owned? How are they distributed geographically? How are training programs governed? What is the content of the programs?

3. **What does the U.S. medical resident population look like**, in terms of demographic characteristics, specialty choice, length and year of post-graduate training, post-training career plans, IMG status, etc.? How much do residents earn?

Collectively, answers to these questions should allow policy makers to better understand how public funds are currently being used within the context of overall GME funding and determine whether the goals set forth for this spending are being met.

Section 2. Methods and Data Sources

We have used different methods to address the questions posed above. First, we have assembled and synthesized secondary data about different aspects of the GME enterprise from a number of different sources. Second, we conducted site visits to five training institutions to talk with GME leaders about how GME financing and governance works within individual institutions to create and support training programs and their trainees. This section describes the secondary data and site visits in more detail.

2.1 Secondary Data

We undertook a review of all major data sources on GME programs, residents, and teaching hospitals for this report. These include data collected by the Accreditation Council for Graduate Medical Education (ACGME), the Association of American Medical Colleges (AAMC), the American Medical Association (AMA), the American Hospital Association (AHA), and the Medicare program. Key sources used in this report include:

- **ACGME Data on Residents and Programs.** ACGME publishes data on the number of accredited programs in the United States, by specialty. As part of the accreditation process, ACGME also collects data on the number of residents in each program. Because these data are linked to accreditation status, they are considered very reliable. However, some programs are not accredited, so the numbers may not reflect the full number of programs or residents.

- **National GME Census.** The *Journal of the American Medical Association (JAMA)* annually publishes tables derived from data collected by the National GME Census. These data are self-reported by residency programs and collected through a joint project of the AAMC and the AMA. Approximately 90 percent of programs update their records in the GME Census each year. For certain measures, we have compiled data from tables published in *JAMA* from 1980 to 2005, to provide information on trends among ACGME accredited programs across the United States and among residents on duty.

- **Medicare Inpatient PPS Impact File.** This file includes data on all hospitals participating in Medicare's inpatient prospective payment system, including information on each hospital's resident-to-bed ratio, number of beds, and other measures. Because these measures are compiled from different sources and different years, they may be less precise than some of the other sources used for this report. Like the ACGME counts, Medicare's counts of residents do not include residents in non-accredited positions. In addition, the impact file undercounts residents for other reasons. Many residents are training at VA hospitals, specialty hospitals, or children's hospitals that do not participate in the Medicare program. In addition, since 1996 hospitals have been limited by caps on the number of residents for which they may receive DGME. Finally, some small programs may choose not to apply for GME funding from Medicare.

- **AHA Hospital Survey.** The AHA conducts an annual survey of hospitals that includes data on their operations as well as some statistics on the number of residents they train. The AAMC publishes summaries of these data in their annual Data Book.

We also hoped to use data from the Intern and Resident Information System (IRIS), maintained by the Centers for Medicare and Medicaid Services (CMS), for this project. IRIS data are reported by hospitals when they submit their Medicare cost reports each year, and include detailed information about their individual residents. However, anomalies in these data made them unsuitable for use in this project.

2.2 Site Visits

We conducted five site visits to examine how GME funding and requirements actually work within training institutions. The visits were designed to engage internal leaders at several teaching institutions in informal discussions of how they perceived external and internal money flows and the role of financing in shaping training programs. The number and mix of sites included is not sufficient to create a picture of training institutions nationwide, but adds some texture to the numeric description of GME based on secondary data.

Each visit included discussions with between four and seven internal leaders. The Designated Information Officer (DIO) at each site was approached to solicit site participation and develop a list of appropriate people for inclusion in the site visit. The DIO was asked to help identify people who: are knowledgeable about GME finances, play an institutional role in GME (e.g., a dean or associate dean, senior hospital administrator), or direct a specific GME program.

Differences in institutional organization mean that the people who fill these various roles may have a variety of job titles and work for either the hospital, medical school, or some other organization. Of the 25 people who participated in the site visits, fifteen worked for the medical school while seven worked for the hospital. Two of the medical school leaders and three other participants had other affiliations, such as the VA, outside consultant, or health system (Exhibit 2.1). More than half (60 percent) of participants were physicians.

Exhibit 2.1 Site Visit Participants

	Organization				
Physician	Hospital	Other	School of Medicine (SOM)	Joint SOM/Other	TOTAL
No	5	3	2		10
Yes	2		11	2	15
TOTAL	**7**	**3**	**13**	**2**	**25**

Source: NORC Site Visit Notes

With a few exceptions, discussions were conducted privately with each participant. The exceptions occurred at the request of a few participants who wanted to include a colleague or staff person or, in one instance, due to a schedule conflict that necessitated a last-minute change. All discussions began with obtaining verbal informed consent based on a protocol approved by

the NORC Institutional Review Board. They were unstructured, although an interview guide (included in Appendix 2) was used to make sure that all key topics were touched on.

In addition, informal group discussions were held with a total of fifteen trainees at three of the sites. At each of these sites, participants were from a variety of programs and at different points in their training. Participants were recruited by the DIO or another internal leader. Participation was voluntary.

Despite efforts to include a variety of teaching hospitals, the participating sites were all academic medical centers. Several community hospitals and hospital systems that have active roles in training were approached to participate, but all declined, as did one academic center. Sites received no incentive to participate. Whether academic centers were more likely to participate because of their interest in research and education, the role of GME in their organizations, or some other factor is unclear. One participating center is part of a larger hospital system.

Section 3. Findings

The US GME system reflects the choices and goals of several different groups of actors whose various decisions shape the amount of funding available for GME, the organizations that participate in the training enterprise and the programs that they support for training, and, finally, the individuals who are trained. This section reviews each of these three topics in turn, starting with GME financing, then describing training institutions and programs and, finally, residents themselves. Throughout the section, observations by leaders and residents who participated in the site visits are interspersed with secondary data.

3.1. Funding for Graduate Medical Education

There are a number of costs associated with training residents in clinic settings, from the direct cost of their salaries and benefits through the indirect costs associated with their involvement in clinical care. These costs are paid through a complicated mix of explicit and implicit sources, including public and private payment for clinical services, research funds, and philanthropic and other funds. In a project for ASPE, RAND recently estimated the funding for GME that comes from various sources (Exhibit 3.1.1).

Exhibit 3.1.1 Funding for GME, FY 2003

Funding Source	Funding Amount (in billions of dollars)
Medicare DGME	2.5
Medicare IME	4.9
Subtotal, Medicare	7.4
Medicaid	2.5
Department of Veterans Affairs	0.8
Deparment of Defense (DoD)	0.3
Children's Hospital GME	0.3
Other HRSA	0.2
Subtotal, Other public	11.5
Private payer	7.2
Total funding related to GME	**18.7**

Source: Wynn et al, 2006.

This section briefly summarizes these various funding sources and how money flows through teaching institutions, based on both secondary data and informant comments from site visits. We start with the Medicare program, then describe other sources, and conclude with informants' understanding of these flows within their own organizations.

Medicare Funding for GME

The Medicare program is, by far, the most important explicit funding source for GME (Exhibit 3.1.1). It makes these payments through two distinct funding mechanisms, known as Direct Medical Education (DGME) and Indirect Medical Education (IME).

Direct medical education payments are intended to offset Medicare's share of the costs of residents' stipends and benefits, salaries of teaching physicians, and other administrative and overhead costs directly attributable to the training program. In 2003, Medicare's DGME payments were estimated at $2.5 billion (Wynn et al., 2006). For each resident, the hospital receives a per-resident amount, based on its reported costs and resident census in the mid-1980s and updated over time. This per-resident amount is adjusted by the hospital's share of inpatient days attributable to Medicare patients, so that Medicare pays more DGME per resident when a higher percentage of the hospital's patients are Medicare beneficiaries.

Medicare's indirect medical education (IME) payments are intended to cover the higher costs of providing patient care in a teaching setting, and totaled $4.9 billion in 2003 (Wynn et al., 2006). These payments are provided as an add-on to the DRG payments Medicare makes for each patient. They are based on a base formula multiplier and the hospital's resident-to-bed ratio. The base formula multiplier has been changed by virtually all Medicare legislation of the past ten years, most recently by the Medicare Modernization Act (MMA), which established a new schedule for phasing in lower multipliers over several years.

DGME and IME payments have additional restrictions that represent efforts by policymakers to use Medicare payment policy to influence the size and mix of physicians trained in the US. Amid widespread concern over a predicted oversupply of physicians and its likely implications for medical care cost growth in the future, Congress capped the number of residents that each hospital can claim for Medicare reimbursement. Each hospital's cap is generally based on the number of residents the hospital claimed in 1996. The MMA allowed for some redistribution of caps across institutions, which was recently implemented.

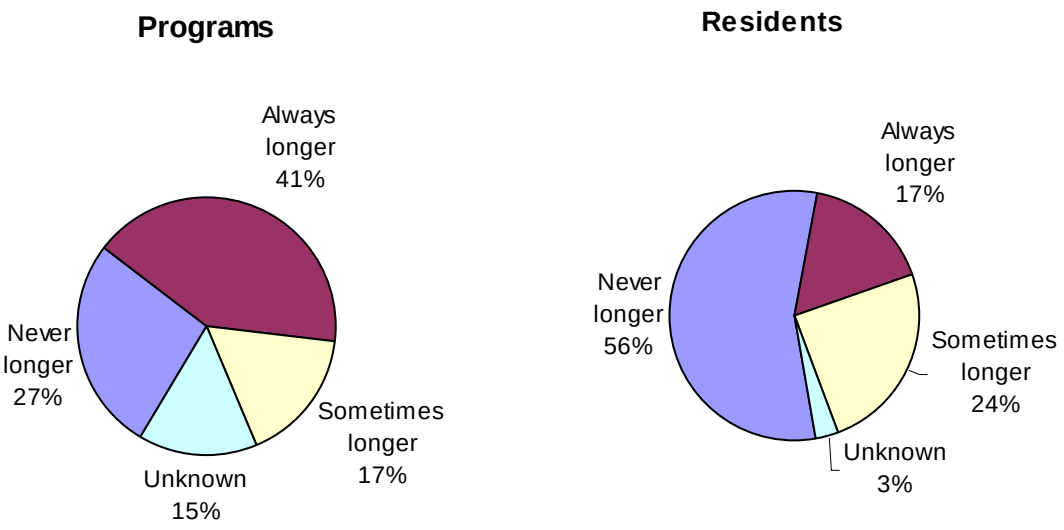
Another effort to steer physician training was in response to a predicted oversupply of specialists. In an effort to rebalance the physician supply toward primary care, Congress created a limit on the number of years that hospitals can receive full DGME and IME funding for each resident. With the exception of residents training in geriatrics, both DGME and IME payments are reduced for residents who have completed initial board eligibility or five years of training, whichever is less. After that initial period, residents count as only half an FTE for the purposes of calculating DGME and IME payments.

It is difficult to generalize at the specialty level about whether all residents will be counted as a whole FTE for purposes of Medicare payment under this policy, but MedPAC (2000) did an analysis of this question. For many specialties, the initial period for training is three to five years, and residents will almost always count as a full FTE.[2] Fewer than a third of programs are

[2] A trainee in a three-year program can end up counting as half an FTE if she has spent more than two years in another covered training program. In addition, some residents in these specialties may go on to subspecialize and hit the five year limit in subsequent years

in these specialties, but they account for over half of all residents (Exhibit 3.1.2). For many subspecialties, training cannot be completed in five years, and residents in their last years of training will always count as half an FTE. These specialties account for about 41 percent of programs, but only 17 percent of residents. For a third of programs, and a quarter of residents, the length of training is sometimes over and sometimes under five years, or MedPAC does not provide data on the length.

Exhibit 3.1.2 Distribution of Programs and Residents by Whether Training Period Will Exceed Five Years, 2006



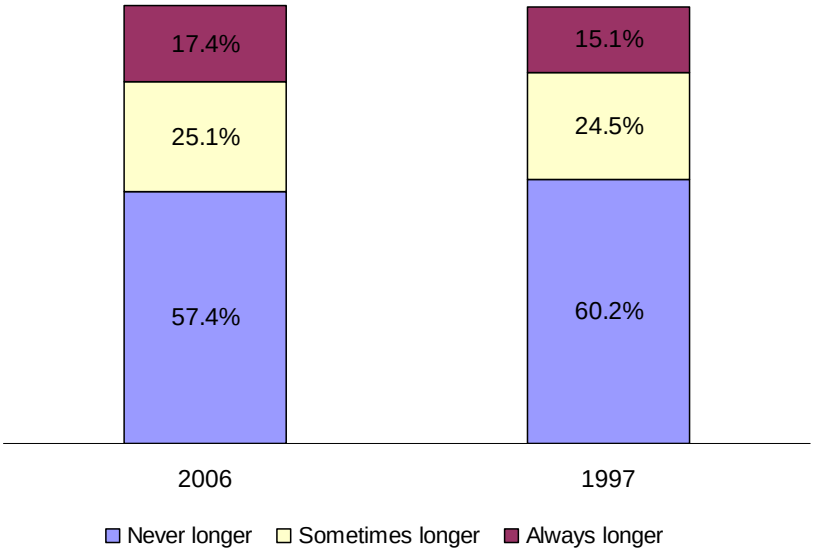
Source: NORC analysis based on MedPAC, 2000 (specialty training period categorization) and Accreditation Council for Graduate Medical Education, "Number of Accredited Programs by Academic Year (7/1/2006-6/30-2007)", Web Accreditation Data System, © ACGME 2005-2006.

The effect of these policy changes to Medicare GME funding may be very diffuse. Medicare is not the only funding source for GME, and other factors such as patient care and research missions may be an important influence on decision-making at many institutions. A study by Chen et al. (2002) showed that more than half of the family residency training programs they surveyed did not know how much GME funding they received from Medicare – suggesting that changes through this mechanism are, at best, a very blunt policy lever. Discussions with leaders at five training institutions confirmed that most are not attuned to the nuances of Medicare funding or policies, as discussed below.

Site visit participants told us in many cases that Medicare's per-resident payments are not a particularly important factor in decisions about program size. If they were, one would expect that specialties that are unaffected by the five-year limit would be growing more quickly than the specialties that take longer than five years to complete. We find that the opposite is true. Among those specialties included in MedPAC's (2000) analysis of program type and Medicare weighting, the specialties that always take longer than Medicare's five-year maximum account

for just over 17 percent of all residents in 2006, a slight increase from the 15 percent share in 1997 (Exhibit 3.1.3).

Exhibit 3.1.3 Distribution of Residents by Whether Program is Longer than Five Years, 1997 and 2006



Source: NORC analysis based on MedPAC, 2000 (specialty training period categorization) and Accreditation Council for Graduate Medical Education, "Number of Accredited Programs by Academic Year (7/1/2006-6/30-2007)", Web Accreditation Data System, © ACGME 2005-2006.

Medicaid

State Medicaid programs continue to be substantial contributors to GME financing. In 2002, 47 states and the District of Columbia contributed to GME through their Medicaid programs through their fee-for-service payments, for managed care patients, or both. [3] Total GME spending under Medicaid is estimated at $2.5 to $2.7 billion (Exhibit 3.1.1; Wynn, 2006; Henderson, 2003), with New York, Michigan, and California contributing the most Medicaid dollars to GME.

On behalf of the AAMC, the National Conference of State Legislatures conducted a survey in 2002 of 51 Medicaid programs to identify whether they make GME payments and the methods used to calculate and distribute these payments. This section draws on the results of that survey, as reported by Henderson (2003).

Of the 48 Medicaid programs that supported GME, all but one (Tennessee) made GME payments under their Medicaid fee-for-service programs in 2002. (Exhibit 3.1.4). Twenty-five states calculate separate DGME and IME payments, 15 of which use the same methodology for

[3] Illinois, Kansas, and South Dakota make no GME payments through Medicaid.

calculating each. Of these 15, eight states base both types of payments on Medicare's methods. Six of the fourteen states that make only DGME payments base them on Medicare's approach. Finally, eight states do not distinguish between DGME and IME, but make some form of explicit GME payment.

A large number of states reported using some "other method" to calculate DGME or IME payments. In general, these other methods are variations on the methods included in the survey response set – methods based on per-resident, lump sum, or per-Medicaid discharge amount. For instance, in Virginia, the per-resident amount is based on Medicaid cost in a base year and adjusted for inflation to the present year. Massachusetts makes GME payments based on per diem DGME costs multiplied by the Medicaid average length of stay. In New York, DGME costs are based on historical hospital-specific costs adjusted for inflation for the present year and are supplemented to include state workforce initiatives.

Exhibit 3.1.4 Distribution of States' Methods For Calculating GME Payments Under Medicaid Fee-For-Service, 2002

Type of GME Payment Made by FFS Medicaid:	Number of States	Method for Calculating Payment: Follows Medicare Method	Per Resident Amount	Lump Sum Amount	Per Medicaid Discharge Amount	Other Method
No GME Payments	4					
No Distinction between DGME and IME	8	0	3	0	1	4
DGME Only	14	6	1	1	1	5
Separate DGME and IME payments:						
DGME (*)	25	11 (8)	1(1)	1(1)	1(0)	11(7)
IME		12	2	2	0	9

* Number in parentheses is the number of states that use the same method for both DGME and IME. For example, 11 states use Medicare's method for calculating DGME payments and 12 use it for calculating IME payments; 8 states are included in both counts. This implies that 3 states use Medicare's method for DGME and a different method for IME.

Note: Pennsylvania reports basing DGME payments on a Lump Sum amount and making no distinction between DGME and IME under Other Method. It has been included only once under the Other Method column in the No Distinction row.

Source: NORC analysis of Henderson 2003.

States typically disperse these payments as part of hospital case or per diem payment rates, although 15 make a separate direct payment (Table 3.1.5). The three states that make distinct DGME and IME payments but do not use the same approach for making the two payments all distribute IME payments as part of hospital payment rates and make separate direct payments for DGME.

In addition to their core payment approach, many states make other kinds of Medicaid payments to teaching programs. For example, Area Health Education Centers in Georgia receive special payments under their Medicaid administrative match funds for clinical training activities.

Exhibit 3.1.5 Distribution of States' Methods For Distributing GME Payments Under Medicaid Fee-For-Service, 2002

Type of GME Payment Made by FFS Medicaid	Number of States	Part of Hospital Per Case or Per Diem Rate	As Separate Direct Payment	Other Method
No GME Payments	4			
No Distinction Between DGME and IME	11	7	4	0
DGME Only	13	10	3	0
DGME and IME Same Method	20	13	5	2
DGME and IME Different Method	3	3 (IME)	3(DGME)	0

Note: South Carolina reports that DME payments are made as part of Hospital Rates, like IME, and also under Other Method. It has been included only under the Hospital Rates column in the DGME/IME Same Method row.

Source: NORC analysis of Henderson 2003

Eighteen states have mechanisms for making payments directly to teaching programs under their Medicaid managed care plans (Table 3.1.6). Tennessee is the only state that makes payments under Medicaid managed care but not fee-for-service. The other 17 make payments under both. Again, it is most common that similar methods are used for distinct IME and DGME payments (9 states), although the specific methods used are somewhat diffuse. One state makes distinct IME and DGME payments based on different methods, using Medicare's FFS approach for IME and some other method for DGME.

Ten states link Medicaid payment for GME directly to state policy goals that support medical training in primary care specialties; medical training in ambulatory sites, rural communities, and underserved communities; and better geographic distribution of the medical workforce. (Henderson, 2003).

Exhibit 3.1.6 Distribution of States' Methods For Calculating GME Payments Made Directly to Teaching Programs Under Managed Care, 2002

	Number of States	Follow Medicare FFS Method	Lump Sum Amount	Per Medicaid Discharge Amount	Other Method
No GME Payment for Managed Care	33				
No Distinction between DGME and IME	4	0	0	1	3
DME Only	4	1	1	1	1
DME and IME Same Method	9	2	0	2	5
DME and IME Different Method	1	1 (IME)	0	0	1 (DGME)

Source: NORC analysis of Henderson 2003
Note: Missouri reports basing DGME payments both on Medicare's FFS Method and Other Methods. It has been included in the Medicare column above.

Other Government Funding Sources

Other federal GME funding comes from VA and DoD support for residency programs affiliated with their institutions. Between them, VA and DoD fund about a tenth of all residents in the United States, and even more pass through VA and DoD facilities. The majority of VA hospitals are associated with medical schools and nearly 30,000 residents each year spend at least part of their time in a VA facility. Of those trainees, the VA funds about 8,700 to 8,900 positions (Wynn, 2006). In FY 2004, military hospitals operated by the DoD were the site of training for 3,026 physician trainees, and DoD sponsored an additional 337 residents in civilian training programs (Wynn, 2006). Funding for these training programs is provided as part of the appropriations for operating costs at VA and DoD facilities.

Congress established a federal Children's Hospital GME Program in 1999, recognizing that free-standing children's hospitals would rarely qualify for GME support through Medicare. This program is funded through annual appropriations; in recent years, these appropriations have approached $300 million annually (Wynn, 2006).

Other government programs designed to support workforce development – such as the Area Health Education Centers and Title VII fellowship programs for selected primary care specialties – represent other sources of GME funding. These programs, also subject to annual appropriations, represent approximately $200 million in funding for GME (Wynn, 2006).

Many teaching hospitals and medical schools are also the sites of extensive medical research. NIH clinical research grants to academic medical centers contribute an unknown amount to training for medical residents, either by supporting teaching faculty or through the direct involvement of residents in research.

Private Funding for GME

Implicitly, private insurers also contribute to the medical education mission by making higher payments for care provided by teaching settings, although the magnitude of this contribution is difficult to determine with any certainty. Gold (1996) and Blumenthal (1996) estimated that managed care organizations pay 5 to 10 percent higher rates to teaching hospitals than to non-teaching hospitals (when they elect to contract with teaching hospitals), while others have estimated this price differential to be much larger, ranging from 15 to 35 percent (AMA, 2002). In its study for ASPE, RAND estimated that private payers paid about $7.2 billion for GME in 2003 through higher rates to teaching facilities (Wynn, 2006). This is roughly comparable to total Medicare payments.

Still other funding comes through grants from private foundations and philanthropies for the support of training, research, or patient care. Industry sources such as pharmaceutical or biomedical companies also contribute to research. In our site visits, respondents noted that industry also may fund residency programs in certain specialized areas.

GME Funding Flows Into and Through Teaching Institutions

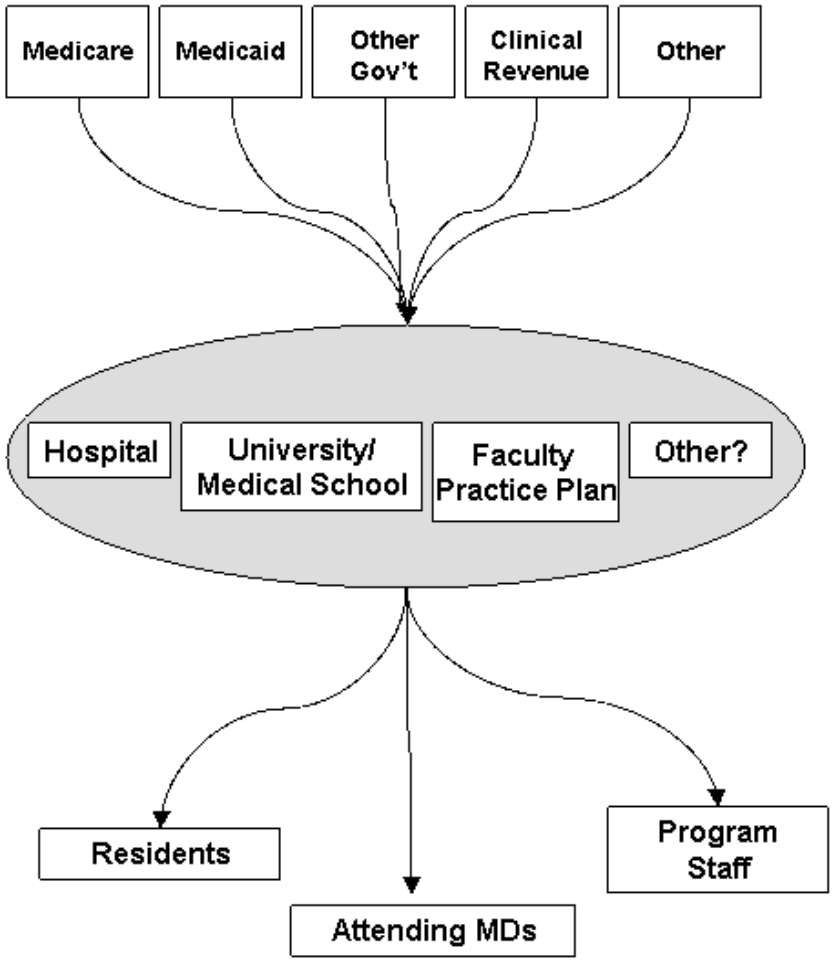
The idiosyncratic nature of the arrangements among organizations that are affiliated with individual training programs leads to complicated flows of funds into and across organizations. This section starts with an overview of this flow and then presents leaders' views about funding sources and how funds flow through their organizations to support residents, attending physicians, and program administration.

Overview. As summarized above, GME is supported through a mix of public and private sources, some of which make payments targeted at GME while others are paying for other things, such as clinical care and research. (Exhibit 3.1.7) Any particular payment is made to one of the organizations, such as Medicare IME and DGME payments that are made to teaching hospitals. There are typically, however, fund transfers among the organizations that end up moving money from the organization that originally received a payment to one of its GME partners.

For example, if the GME Office, which actually issues residents' salary checks, is located within the university/medical school, then the hospital will transfer funds to the university/medical school that likely include the Medicare payments. The flows of funds of among hospital, medical school, faculty practice plan, and other entities can become quite complicated and often combine GME with other shared activities, particularly with regard to paying attending physicians. As a result, it can be difficult to trace money from a specific source to its ultimate use. As described below, internal leaders may have some sense of how the total amount of money received from, say, Medicare compares to recorded direct GME costs such as residents' salaries. This is different from knowing that Medicare pays for these salaries, however, since the Medicare payments may be made to a different organization than that which pays the salary or, if these are both within one hospital, to different units with the hospital.

The difficulty in accounting for the ultimate use of a particular funding stream is exacerbated by the fact that residents are always paid by their program's home institution but typically rotate through several sites in the course of their training, many of which can claim Medicare support while they are on site. Programs typically have formal agreements in place that call for the rotation site to pay the home institution for the resident's time, although there are many cases in which such payments are not made. In addition, the amount received by different hospitals for an individual resident differs due to Medicare policy, so the agreement may call for a payment based on the home institution's per resident amount which can be much different than that at the rotation site. If internal leaders in a particular hospital have a sense that Medicare roughly covers the salaries of the residents based in that hospital, this may be in part due to, for example, a Medicare per resident amount that is much higher than they are paying to the home institutions from which they receive rotating residents. In this example, residents from other programs who rotate through the hospital essentially become a source of revenue for the hospital. Because these various arrangements may have different implications for different organizations, programs, or units, leaders within an academic medical center or teaching hospital may have different levels of understanding about them and their financial implications.

Exhibit 3.1.7 Flow of GME Funding



Source: NORC

Leaders' Views. Each site visit discussion included questions about external funding sources and internal flow of funds (see Appendix 2). Participants were encouraged to describe their own understanding of these issues, not to worry about tracking down data from other resources. The goal was to identify leaders' working understanding of these issues rather than to develop an accurate accounting of each institution's finances.

In general, leaders have very different levels of understanding of both external funding sources and internal fund flows, both within and across the five sites. There appeared to be a tradeoff between specific knowledge about funding streams and program content among site participants. It was clear that, in many cases, those closest to working with residents were often the least knowledgeable about the particulars of GME funding and costs. Conversely, those most knowledgeable about the money often knew less about other factors driving program content, such as RRC requirements.

Similarly, there was some variation in the knowledge of residents about how GME is financed. At two of the three resident discussions, there was little known. At the third, residents were somewhat more aware of funding in general and Medicare's role in particular. Among the group, at least one participant was familiar with the existence of the caps and that per-resident DGME payments differed across hospitals, while all of them knew that Medicare was the main source of explicit GME support. These residents thought their higher level of familiarity, particularly with Medicare's role, reflected some recent internal changes in the role of residents in GME governance and implementation of new rules, such as the 80-hour week.

The organization of a training program seems to be associated with leaders' perceptions of many aspects of how GME is managed and financed. For example, in the case of a medical school-based GME office, most leaders consider "the hospital" to be the key revenue source, with little or no awareness of the role of external entities, such as Medicare, Medicaid, and the VA, in funding training. This presumably reflects the fact that the hospital transfers significant amounts of money to the medical school, which in turn pays the residents. When the GME office is located in the hospital, leaders seem to be more aware of the role of external funding streams. Not surprisingly, leaders in the GME office at the site that had a GME office external to both the teaching hospitals and medical school were knowledgeable about Medicare and other funders in general and were aware that different organizations within the consortium received different per resident amounts and caps from Medicare. Despite the differences in Medicare per resident amount received by consortium hospitals, all residents within the consortium receive the same salary, clearly leading to differences in the share of resident costs borne by Medicare.

By design, at least one participant in each site was an expert at understanding the Medicare regulations governing GME payments and their related reporting requirements. In many organizations, very few participants besides this individual appeared to have a strong understanding of Medicare, resident caps, and per-resident amounts, although many were familiar with these words. Informants generally thought of Medicare as single pool of money, even if they were fairly knowledgeable about the difference between DGME and IME payments. At most sites, this Medicare pool was perceived as roughly sufficient to cover resident salaries and benefits, but did not cover associated training costs such as teaching materials, program administration, and attending physician salaries.[4]

Medicare's role in GME was often discussed in terms of the cap on number of trainees, not the per-resident amount. Some respondents expressed confusion over how the redistribution of the caps affected their programs and had been struggling to get clarification from CMS. However, four of the five sites have developed a number of ways to support trainees beyond those for which they receive Medicare funding. In these four sites, clinic revenues, research, philanthropy,

[4] The perception that Medicare (IME and DGME) roughly covers the costs of resident salaries, benefits, and other direct training costs is somewhat supported by the aggregate training costs implied by the secondary data reported elsewhere in this report. There are approximately 100,000 trainees who are paid somewhere between $42,000 and $50,000, implying total salaries of somewhere between $4.5 billion and $5 billion. Based on a standardized benefit rate of about 25 percent, salaries plus typical employment benefits such as insurance are therefore just under $6 billion. Programs report incurring a number of additional benefits, such as parking, meals, and other supplies that are, at least in some cases, almost comparable to other benefit costs, pushing the aggregate cost toward $7 billion, which is slightly less than total Medicare payments in 2003.

and other resources have reduced reliance on Medicare. Leaders in these programs described resident salaries being driven by market considerations, not by institutional per-resident amounts. In fact, at least two sites are part of multi-institutional training arrangements under which resident salaries are set by a group composed of representatives from a number of organizations, each of which has different Medicare per-resident amounts. Trainees in these programs are paid the same salary, regardless of the institution's per-resident amount.

The role of Medicare financing was described in qualitatively different ways at the most resource-constrained site, which also had the highest indigent-care patient mix. In this site, the Medicare cap and per-resident amount were an essential part of how decisions were made. This site was also experiencing a staffing shortage, and staffing needs played a critical role in decisions about residency programs. Leaders at this site consistently implied that Medicare funding and clinical service needs were much more dominant to program management and design than at the other four sites.

The role of other funders – Medicaid, the VA, other state programs, endowments, and donations – was very unclear to most participants. For example, at least one site is located in a state where Medicaid does not provide GME support, but several people listed it as a GME revenue source for their programs. Conversely, at the one site where Medicaid GME payments are larger than Medicare payments, most participants still clearly considered Medicare the most important payer.

Several sites we visited have VA-affiliated programs. Arrangements for these programs are typically negotiated on an FTE basis, with program directors determining the number of specific individuals who rotate through the VA in a program year. The VA pays a negotiated amount per FTE, for which the affiliated medical school submits a bill and receives payment. According to a few respondents, the VA can only be affiliated with medical schools, so these arrangements are always based in the medical school, even if the residents are directly employed by the hospital or other entity. As a result, if the sponsoring organization for a program is not the medical school, there is an internal flow of funds of this VA money through the medical school to the appropriate entity.

One residency program at one site received money directly from the state, since the legislature had determined that increasing the number of physicians in this specialty was essential to the state's health system. Although the amount of money involved was modest, the program director thought that paying the money directly to the program via the medical school, rather than through the teaching hospital, raised the profile of the state support. This made internal leaders more attuned to state needs beyond the specific parameters of the financial support.

Neither external funds nor transfers from the hospital are typically thought to cover any significant level of attending physician salaries. One respondent explicitly described the time faculty spend attending residents as volunteer time, since it was not compensated. Some RRCs require that key personnel, such as the program director, have a certain share of protected time for program oversight. Sites cover this time through faculty practice plan revenue, other clinical dollars, or other resources identified by clinical department chairmen.

Some leaders have begun to revisit their commitment to accreditation, particularly for small, very specialized programs. This may reflect the apparent growth (not documented here) in non-accredited fellowship programs[5] that are funded through alternative sources, such as industry and research funds. Perhaps as they have gained experience with these programs, several leaders said that they were not sure that accreditation is important for some subspecialty programs, particularly when they can identify other funding opportunities and have physician leaders who lend sufficient prestige to attract high-quality trainees. As a result, the role of Medicare funding could become less important in some subspecialties if some programs do, in fact, decide to forego accreditation.

3.2. Characteristics of U.S. Residency Programs and Teaching Hospitals

In this section, we examine in more detail the residency programs and teaching hospitals that comprise the U.S. system of graduate medical education – how many programs there are and in what specialties, where they are located, and the characteristics of the hospitals where residents are trained.

Number of Programs and Residents per Program

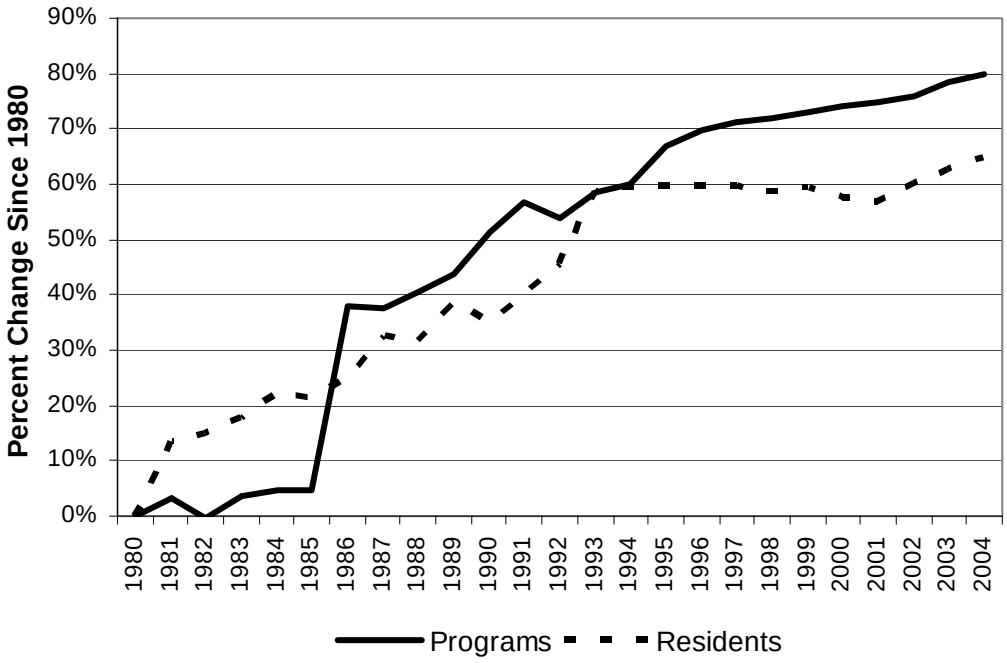
In the 2005/2006 school year, there were 8,300 accredited and combined residency programs training 104,986 residents (ACGME, 2006). The number of residency programs in the United States has grown fairly steadily since 1980, with a particularly large increase in 1986 (Exhibit 3.2.1).[6] The data indicate an 80 percent increase in the number of ACGME accredited programs and combined specialty programs between 1980 and 2004 (from 4,588 to 8,246 programs). During this same period there was a 65 percent increase in the total number of residents on duty. As a result, the number of residents per program has dropped slightly, from an average of 13.4 in 1980 to an average of 12.3 in 2004.

The most commonly offered programs are in general practice fields (Exhibit 3.2.2). There are 1,878 programs in internal medicine and its subspecialties, of which 388 are in general internal medicine. There are 865 programs in pediatrics and its subspecialties, 204 of which are in general pediatrics. There are 583 programs in family medicine and its subspecialties, of which 464 programs are in general family medicine. These programs tend to be larger than average, and also account for the largest numbers of residents.

[5] ACGME defines a fellow as "[a] physician in a program of graduate medical education accredited by the ACGME who has completed the requirements for eligibility for first board certification in the specialty. Such physicians are also termed subspecialty residents. Other uses of the term "fellow" require modifiers for precision and clarity, e.g., research fellow" (ACGME Glossary, 2006). Other sources and individuals use the term more broadly to include those undergoing subspecialty training regardless of program accreditation status.

[6] This increase is due to a large number of subspecialty programs that were newly accredited between December 1985 and December 1986, and included in the data for the 1986 school year (Crowley et al. 1986, 1987).

Exhibit 3.2.1 Change in Number of Programs and Residents, 1980-2004



Source: NORC analysis of JAMA, 1992-2005; Rowley et al 1991 and 1990; Etzel 1989; Crowley et al 1980-1988

Exhibit 3.2.2 Top 10 Fields, by Number of Programs, 2005/2006

	Number of Programs, 2005/2006	Number of Positions Filled, 2005/2006	Residents per Program, 2005/2006
Internal medicine and subspecialties	1,878	31,540	16.8
Pediatrics and subspecialties	865	10,714	12.4
Family medicine and subspecialties	583	9,986	17.1
Pathology-anatomic and clinical and subspecialties	517	2,820	5.5
Radiology-diagnostic and subspecialties	472	4,816	10.2
Surgery-general and subspecialties	464	7,853	16.9
Psychiatry and subspecialties	464	5,784	12.5
Orthopaedic surgery and subspecialties	343	3,524	10.3
Neurology and subspecialties	330	2,115	6.4
Anesthesiology and subspecialties	314	5,500	17.5

Source: NORC analysis of Accreditation Council for Graduate Medical Education, "Number of Accredited Programs by Academic Year (7/1/2006-6/30-2007)", Web Accreditation Data System, © ACGME 2005-2006.

Among these and the other popular fields, there have generally been only small changes in the number of programs offered since the 2001/2002 school year. The exception is neurology, in which there has been a 23 percent increase due to increases in subspecialty programs such as pain medicine, neuromuscular medicine, neurodevelopmental disabilities, and vascular neurology.

Other significant increases occurred in less common programs. Eighteen specialties or subspecialties experienced a change of at least 10 programs in the last five years (Exhibit 3.2.3). ACGME lists 16 types of programs that did not exist in their listings for the 2001/2002 school year; in 6 of these subspecialties, there are at least 10 new programs. In addition, there have been large increases in certain subspecialties. Particularly noteworthy are the increases in programs for interventional cardiology, selective pathology, and sports medicine, each adding more than 25 programs.

During the same time period, three subspecialties have seen a decrease of at least ten programs. The largest decrease in absolute terms has been in family medicine, which lost 33 programs. The largest decreases in relative terms have been in clinical and laboratory immunology, which has only one program listed in the ACGME data.

Exhibit 3.2.3 Specialties and Subspecialties with an Increase or Decrease of 10 or More Programs Between 2001/2002 and 2006/2007

Specialty	Subspecialty	Programs, 2005/2006	Change Since 2001/2002	% Change
Specialties or subspecialties adding 10 or more programs				
Internal medicine	Interventional cardiology	127	45	55%
Pathology-anatomic and clinical	Selective pathology	40	31	344%
Family medicine	Sports medicine	81	26	47%
Surgery	Surgical critical care	85	14	20%
Family medicine	Geriatric medicine	36	13	57%
Emergency medicine		135	11	9%
Internal Medicine	Clinical cardiac electrophysiology	85	11	15%
Internal medicine	Hematology and oncology	125	11	10%
Orthopaedic surgery	Orthopaedic sports medicine	65	10	18%
New specialties or subspecialties				
Dermatology	Procedural dermatology	31	31	
Neurology	Vascular neurology	30	30	
Pediatrics	Developmental-behavioral ped.	28	28	
Sleep medicine	Sleep medicine	25	25	
Psychiatry	Psychosomatic medicine	20	20	
Medical genetics	Molecular genetic pathology	15	15	
Specialties or subspecialties losing 10 or more programs				
Family medicine		466	-31	-6%
Allergy and immunology	Clinical and laboratory immunology	1	-10	-91%
Preventive medicine		75	-10	-12%

Source: NORC analysis of Accreditation Council for Graduate Medical Education, "Number of Accredited Programs by Academic Year (7/1/2006-6/30-2007)", Web Accreditation Data System, © ACGME 2005-2006.

For the most part, the number and mix of programs at the five sites we visited appears to be fairly stable. When asked what would cause them to enlarge or discontinue a program, respondents talked about physician interest in the program, ability to provide a high-quality program from the perspective of patient experience and other learning opportunities, and ability to attract high-caliber residents. Low match rates or perceived drops in resident quality were the most likely reason for a site to consider scaling back or discontinuing a program. At four of the five sites, financial considerations were consistently reported to be secondary to these content and quality issues, with most informants believing that if high-quality leadership, content, and trainees were involved, lack of Medicare funding would not limit a program's size.

Some leaders commented on the importance of having particular programs as incentives to attract and retain high-quality physicians to the medical school faculty. In this case, costs associated with creating or maintaining a program are essentially considered along with others such as establishing and maintaining a lab for an incoming faculty member.

Teaching Hospitals

Resident training occurs in a broad array of clinical settings, from community clinics to large academic medical centers.[7] There are no consistent data sources for the number and types of non-hospital settings, but data about training hospitals are available through Medicare and other data sources.

The Medicare IPPS Impact File lists 1,098 hospitals reporting residents for the purposes of GME payments – about 30 percent of the hospitals in the United States (Exhibit 3.2.4). The number of residents per hospital can vary widely. We estimate that at the extremes, 59 teaching hospitals have less than 1 full-time resident, while 17 hospitals have 500 or more full-time residents. On average, teaching hospitals report about 73 residents.[8]

Exhibit 3.2.4 Distribution of Hospitals by Number of Residents

Number of Residents	Hospitals
0	2579
>0 but <1	59
1-10	298
10-50	381
50-500	343
>500	17

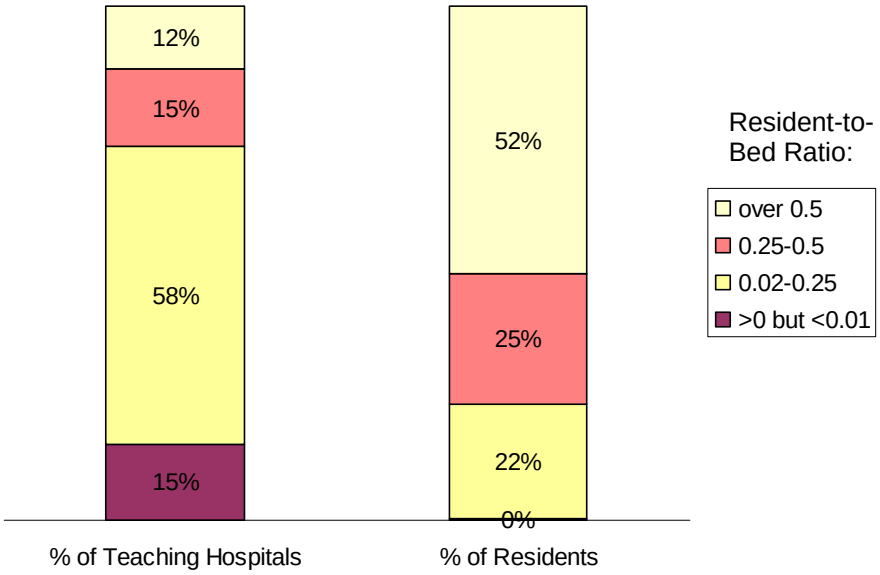
Source: NORC analysis of CMS Impact File for FY 2007 Inpatient PPS. Based on March 2006 MEDPAR and Provider Specific File, and FY 2003/2004 Cost Reports.

[7] An academic medical center consists of: an accredited medical school; an affiliated faculty practice plan that is tax exempt under federal law or is part of an exempt organization under an umbrella designation; and one or more affiliated hospitals in which a majority of the medical staff consists of physician-faculty members and a majority of admissions are made by physician-faculty members. 42 C.F.R. §411.355(e)(2)

[8] Number of residents per hospital estimated by multiplying the resident-to-bed ratio by the number of beds reported at the hospital. Because these two variables may have been reported to CMS at different times, actual numbers of residents per hospital may vary from this estimate.

The AAMC classifies any hospital with a resident-to-bed ratio of more than 0.25 as a "major" teaching hospital. There are 298 hospitals that meet this threshold in the Medicare IPPS Impact File – about 27 percent of teaching hospitals, and just 8 percent of all hospitals (Exhibit 3.2.5). Those 298 hospitals train about 62,000 residents, or more than three-fourths of the residents reported to Medicare.[9] In fact, over half (41,792) of the residents in the Medicare data are trained in the 134 hospitals that report at least half a resident for every bed – a very intensive teaching environment.

Exhibit 3.2.5 Distribution of Hospitals and Residents, by Hospital Resident-to-Bed Ratio



Source: NORC analysis of CMS Impact File for FY 2007 Inpatient PPS. Based on March 2006 MEDPAR and Provider Specific File, and FY 2003/2004 Cost Reports.

Hospitals with residents tend to be larger than hospitals that do not train residents, and hospitals that have a higher teaching intensity tend to be even larger (Exhibit 3.2.6). Major teaching hospitals have an average daily census of 297 patients, while hospitals with a lower teaching intensity have an average daily census of 179 patients, and hospitals that do not train residents have an average daily census of just 66 patients. Teaching hospitals also see a different mix of patients: they have a higher disproportionate share percentage (a reflection of the share of patients who are poor and/or uninsured), and Medicare patients make up a smaller percentage of their caseload. Teaching hospitals also have a higher average wage index, likely a reflection of the fact that they tend to be in large urban areas.

[9] The FY 2007 IPPS file lists 80,138 residents. This number is lower than the total number of residents in the United States for several reasons: it does not include residents in obstetrics/gynecology or other unaccredited programs; it does not include VA facilities or children's hospitals; and it does not include residents over a facility's cap, and undercounts residents who are beyond Medicare's limit on the number of training years.

Exhibit 3.2.6 Hospital Characteristics by Teaching Status

	Average Daily Census	Average DSH %	Average Medicare %	Average Wage Index
Hospitals without residents	66	25%	53%	0.96
Hospitals with residents				
Fewer than .25 residents/bed	179	27%	45%	1.02
More than .25 residents/bed	297	41%	34%	1.09
All Hospitals	**110**	**27%**	**49%**	**0.98**

Source: NORC analysis of CMS Impact File for FY 2007 Inpatient PPS. Based on March 2006 MEDPAR and Provider Specific File, and FY 2003/2004 Cost Reports.

There are major teaching hospitals not included in the Medicare data, because they do not participate in Medicare's inpatient PPS. These include 19 children's hospitals, 64 VA medical centers, and 38 military facilities (Mallon, 2004, and JAMA, 2003).

As part of their training experience, residents rotate through a variety of settings. Historically, these rotations were created to expose trainees to a broader range of patients and diseases than may typically occur at a single hospital. More recently, community-based rotations have been developed to give trainees more ambulatory care experience, again broadening the mix of patients and clinical needs they experience in the course of their training. The role of such community-based rotations is different across specialties, with some RRCs, such as family medicine, explicitly requiring time in community settings.

In our site visits, we spoke with program leaders about why they include certain hospitals as sites for clinical training. Factors cited as reasons to consider working with another training site included:

- the reputation and track record of key clinical leaders;
- the adequacy of supervision available for residents;
- whether the service volume and population mix would provide new experiences for residents; and
- whether partnering with the institution would create new funding opportunities.

In some cases, leaders felt that arrangements with other institutions were maintained for historical or political reasons rather than because they are necessary to running a high-quality program. Many commented on the challenge of ensuring that residents are receiving appropriate oversight and gaining the intended clinical experience in off-site rotations. Strategies for managing these relationships range from regular meetings among program and rotation leaders to resident surveys that solicit very specific feedback about rotation experiences.

Adding to the complexity of potential arrangements, many participants mentioned that there are often ad hoc arrangements made among physicians to accept the students of colleagues at different institutions for a short period of time. These arrangements are not always subject to the same level of documentation as standing training rotations. It is unclear, for example, whether

residents in one of these informal rotations are counted in the data a hospital would submit to Medicare.

Geography

Training opportunities are not evenly distributed around the country (Exhibit 3.2.7). Almost half of all residency programs in the United States are located on the east coast. New York alone accounts for more than 13 percent of the programs in the country, more than any other single state.

Exhibit 3.2.7 Geographic Distribution of GME Programs and Residents, 2002/2003

	No. of Programs	% of Programs	Teaching Hospitals	% of Teaching Hospitals	No. of Resident Physicians	% of Resident Physicians
New England	635	8%	64	6%	8,086	8%
Middle Atlantic	1760	22%	214	19%	24,169	24%
East North Central	1335	17%	212	19%	16,800	17%
West North Central	537	7%	96	9%	6,356	6%
South Atlantic	1315	17%	135	12%	15,317	15%
East South Central	386	5%	55	5%	4,344	4%
West South Central	736	9%	107	10%	9,169	9%
Mountain	295	4%	58	5%	3,455	3%
Pacific	903	11%	144	13%	11,701	12%
Puerto Rico	66	1%	13	1%	779	1%
Total	**8064**	**100%**	**1098**	**100%**	**98258**	**100%**

Source: Accreditation Council for Graduate Medical Education, "Resident Physician Population by Specialty and State, Academic Year 2003-2004" Web Accreditation Data System©, ACGME 2005-2006 and NORC analysis of CMS Impact File for FY 2007 Inpatient PPS (teaching hospitals).

Nearly a fifth of programs are located in the East North Central region (Illinois, Indiana, Wisconsin, Ohio, and Michigan), with Illinois and Ohio each accounting for 5 percent of the nation's total. Texas (in the West South Central region) accounts for another 6 percent of all residency programs. Just over a tenth of programs are located on the west coast (the Pacific region); California accounts for just over 8 percent of all programs in the country. The distribution of teaching hospitals and residents follows a similar pattern.

There has been little variation in the distribution of residents across regions over the past 25 years. The largest shift was seen in 1980 when the percentage of residents in the Pacific region decreased and the percentage in the Middle Atlantic region increased sharply. Since then, the pattern has remained fairly stable.

The concentration of programs and physicians on the east coast is not due merely to the concentration of the overall population or hospitals (Exhibit 3.2.8). In the northeast, the ratio of resident physicians to the overall population is far higher than in other regions. Massachusetts and New York have the highest ratio, with 72 and 76 trainees per 100,000 people. In contrast,

Idaho, Montana, and Alaska have the lowest proportion of trainees by this measure, with just 2 to 4 resident physicians for every 100,000 people. The ratios of resident physicians to hospitals and to hospital beds yield similar patterns.

Exhibit 3.2.8 Resident Population and Bed Ratios, by Region

	Resident Physicians per 100,000 population	Resident Physicians per hospital bed, across all hospitals	Resident Physicians Per Teaching Hospital	Resident Physicians Per Teaching Hospital Bed
New England	57	0.25	106	0.30
Middle Atlantic	59	0.23	106	0.27
South Atlantic	27	0.09	81	0.17
East North Central	37	0.16	72	0.20
West North Central	33	0.11	50	0.14
East South Central	25	0.06	56	0.14
West South Central	28	0.08	58	0.16
Mountain	18	0.07	42	0.14
Pacific	24	0.09	52	0.15
Puerto Rico	18	0.06	35	0.18
Total	**34**	**0.12**	**73**	**0.19**

Source: JAMA, 2003 (Residents per 100,000 Population); NORC analysis of CMS Impact File for FY 2007 Inpatient PPS. Based on March 2006 MEDPAR and Provider Specific File, and FY 2003/2004 Cost Reports (all other data).

Exhibit 3.2.9 Regional Distribution of Programs in Selected Specialties, 2003/2004 School Year

	All	Anesthesiology	Family practice	Internal medicine	Radiology-diagnostic	OB/GYN	Pediatrics	Psychiatry	Surgery-general	Transitional year
New England	8%	10%	3%	9%	11%	6%	5%	9%	8%	6%
Middle Atlantic	22%	23%	14%	28%	26%	26%	24%	24%	24%	19%
South Atlantic	17%	14%	20%	17%	17%	18%	16%	13%	17%	26%
East North Central	5%	5%	5%	4%	6%	4%	5%	5%	5%	4%
West North Central	7%	8%	9%	5%	6%	5%	5%	7%	6%	6%
East South Central	11%	11%	13%	11%	11%	11%	12%	12%	11%	13%
West South Central	9%	11%	11%	7%	8%	9%	9%	10%	8%	8%
Mountain	17%	15%	15%	14%	13%	17%	17%	15%	17%	11%
Pacific	4%	3%	7%	3%	3%	3%	3%	4%	4%	4%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: NORC analysis of Accreditation Council for Graduate Medical Education, "Number of Accredited Programs by Academic Year (7/1/2006-6/30-2007)", Web Accreditation Data System, © ACGME 2005-2006.

In general, the geographic distribution of specific specialty training programs tends to follow the distribution of programs overall (Exhibit 3.2.9). However, the distribution of family practice programs is slightly different. States in the northeast have a lower share of these programs than of programs overall, and other areas have more of these programs. In part, this may be because states with only a few programs tend to have programs in family medicine.

There is some evidence that the location of a physician's residency program influences where he or she practices after completing training. On average, of the physicians in the United States whose residency program was in a given state, just under half are currently practicing in that state. This is a much stronger effect than the location of the physician's medical school: of physicians who graduated from a medical school in a given state, fewer than a third are currently practicing in that state (AAMC, 2006).

GME leaders are aware of this tendency. One of the study sites was in a community with a chronic undersupply of physicians, and leaders there described a number of efforts they have made to work with undergraduate medical students and even medical school applicants to encourage them to stay for their residency training. They have estimated that very few physicians return to their community after residency elsewhere, while a large share of those who both go to medical school and complete a residency in their community remain to practice there. As a result, they are trying to develop strategies and incentives to have students remain after medical school, and to encourage local university students to apply to the local medical school.

Urban/Rural

Residency training opportunities are highly concentrated in urban areas (Exhibit 3.2.10). CMS identifies the location of hospitals as large urban (in a Metropolitan Statistical Area with over 1 million population), other urban (in a Metropolitan Statistical Area with under 1 million population) and rural (not located in a Metropolitan Statistical Area). Over half of the hospitals receiving Medicare GME funding are in large urban areas, and nearly three-fourths of residents are trained in large urban areas. A quarter of residents are trained in "other" urban areas, and only about one percent are trained in rural areas.

The concentration of residents in large urban areas is due to several factors. A higher percentage of hospitals in large urban areas are teaching hospitals. Among teaching hospitals, those in large urban areas also have a higher concentration of residents, with more residents per hospital and per hospital bed. Only six percent of hospitals in rural areas have any residents at all, and when they do have residents, these hospitals have far fewer trainees than their urban counterparts.

In response to a shortage of physicians practicing in rural areas, one proposed solution has been to increase the number of training opportunities in rural areas. Just as physicians tend to stay in-state after their residency, there is evidence that rural residency training can make physicians more likely to practice in rural areas. For example, Bowman and Penrod (1998) found that graduates of family practice residency programs that required more rural training months or that were located in more rural states were more likely to go into practice in rural areas. Similarly, in

a 1991 study, Dorner randomly selected residency programs in the ten most common specialties and requested information on where residents established practice after completing their programs. Over 40 percent of physicians had moved less than 10 miles from their residencies, and primary care physicians moved shorter distances than did those from other specialties.

Exhibit 3.2.10 Urban/Rural Status of Teaching Hospitals and Residents

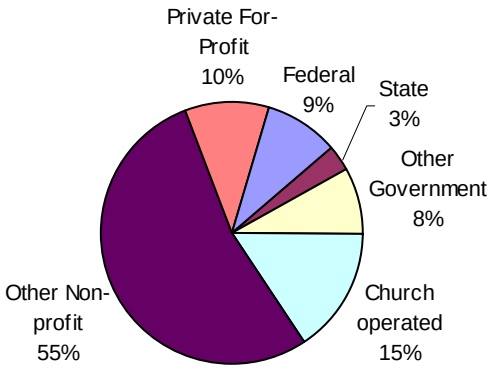
	Large Urban	Other Urban	Rural	TOTAL
Teaching hospitals	652	379	67	1098
% of teaching hospitals	59%	35%	6%	100%
Residents	58448	20689	1001	80138
% of residents	73%	26%	1%	100%
Of all hospitals, % with residents	44%	33%	6%	30%
Residents per teaching hospital	89.6	54.6	14.9	73.0
Residents per teaching bed	0.23	0.15	0.07	0.19

Source: NORC analysis of CMS Impact File for FY 2007 Inpatient PPS. Based on March 2006 MEDPAR and Provider Specific File, and FY 2003/2004 Cost Reports.

Ownership of Teaching Hospitals

AAMC publishes data on the ownership of teaching hospitals (Exhibit 3.2.11). Over two thirds (70%) of teaching hospitals are non-profit or church operated hospitals. Another fifth of teaching hospitals are operated by a government agency, including federally owned hospitals (VA and military facilities) as well as hospitals owned by state or local governments. Private, for-profit teaching hospitals make up only a tenth of all teaching hospitals. Because training programs can be sponsored by other entities, the ownership status of programs is slightly different from that of teaching hospitals. For example, state universities are more likely to sponsor residency programs than to own the hospitals where residents train.

Exhibit 3.2.11 Ownership of Teaching Hospitals



Source: AAMC, 2005.

Program Content and Decision-Making

The way that residents split their time among clinical care, didactic and other formal learning, and research differs across specialties, reflecting Residency Review Committee (RRC) requirements, board expectations, and the practice of medicine in different fields, in addition to local program decisions. For example, specific clinical time requirements for family practice trainees are more extensive than those for pathology or thoracic surgery trainees (Exhibit 3.2.12).

Respondents in our site visits cited RRCs and specialty boards as having a strong influence on the content of their program. Respondents generally thought that RRCs worked hard to establish sensible requirements and monitor program quality. Some thought that RRCs should be more mindful of the cost implications of changes in program requirements. Most felt that the RRCs and specialty boards sent consistent signals about how programs should be training residents, but some cited minor examples of the two being at cross purposes.

Site visit participants' estimates of the share of time spent in clinical care ranged from 50 to 80 percent, with specialties like pathology at the lower end and internal medicine and pediatrics at the high end. Formal learning time was typically estimated between 15 and 25 percent, with some aspects common across specialties. The largest differences in program design among sites appear in the extent to which formal time for research is included as part of residency programs.

Exhibit 3.2.12 Selected RRC Requirements for Residents in Pathology, Family Practice, and Thoracic Surgery

Pathology	Family Practice	Thoracic Surgery
CLINIC TIME		
50 autopsies Examine and sign out at least 2,000 surgical pathology specimens Examine at least 1,500 cytologic specimens 200 operating room consultations (frozen sections)	Residents must see patients in a Family Medicine Center (FMC) for a minimum of 40 weeks/year. At least 1650 patient visits, with at least 150 visits occurring in the first year. Must also gain experience in surgical care, inpatient care, maternity, emergency care, dermatology, mental health.	Min 125 major operations Other surgical procedures Chief year: resident must assume senior responsibility for the pre-, intra-, and post-operative care of patients with thoracic and cardiovascular disease. Complete outpatient responsibilities
DIDACTIC / FORMAL LEARNING		
Specific educational components of anatomical and clinical pathology Interpretation of lab data Regularly scheduled seminars, conferences, rounds Education of medical students	100 hours of management and leadership instruction Conferences	Experience in broad range of disorders. Regularly-scheduled teaching conferences, mortality and morbidity conferences, rounds, and other educational activities
RESEARCH		
Residents should be exposed to and encouraged to participate in clinical or laboratory research, research seminars, work-in-progress sessions, and organized reviews of intradepartmental research. Residents should be provided an environment that promotes research or scholarly activity.	Resident should participate in scientific inquiry, either through direct participation in research, or undertaking scholarly projects. Resident should develop and demonstrate skills in locating sources of pertinent scientific data; obtaining information about diagnostic and therapeutic effectiveness; and applying evidence studies to patient care. Programs should provide supervised, ongoing forum in which residents explore and analyze emerging scientific evidence pertinent to family medicine and apply emerging knowledge to their own patient panels.	A protected research assignment is not permitted during the program; resident participation in scholarly activities should be encouraged.

Source: NORC analysis of ACGME Program Requirements, 2004 and 2005.

Some RRCs have explicit research time requirements for programs, while others do not. At some sites, leaders describe mechanisms through which interested students spend more time at research when it is not a large formal part of the program, typically through electives, extracurricular time, or additional time training "off the clock" to gain research experience. One program we visited has added an additional year to its program so trainees can have more research experience. This type of design decision in turn leads to a shift in the mix of residents

who are interested in coming to the program, in the number and type of faculty involved in the training program, and in the Medicare funding available for later training years. Implementation of the 80-hour week limit has led to a shift in the share of time spent in each of the three activities, with many informants indicating that it may not yet be in a new steady equilibrium.

Informants felt that their residents were exposed to patients from a broad socio-economic spectrum and to a clinically challenging and appropriate case mix. In some cases, this is achieved through external rotations, while in others the home teaching hospital provides this heterogeneity. The role of community-based, non-hospital training opportunities was described as modest in all sites, although essential in some programs, such as family medicine. Some trainees expecting to have a larger share of private-pay and non-minority patients in their practice expressed concern about the potential mismatch between their training and professional career practice environments. At the site with the highest level of indigent care, residents wondered if the time they spent dealing with complicated patient and family communication and resources challenges was undermining their exposure to more clinical experiences and knowledge of how to deal with private insurers. They seemed somewhat overwhelmed by the extent of the social and medical needs of their patients and the limited staff available at the hospital to help attend to these needs.

Several informants mentioned that one area that their programs may be failing to prepare residents for practice is issues relating to practice management, billing, and negotiating with payers. All programs cover this topic to some degree, but individuals at most sites thought that they should try to provide more information and tools for dealing with these areas of professional practice.

For the most part, program and institutional leaders describe clear internal policies and procedures that program directors follow to make changes to a program, such as adding a new site for rotation or changing the mix of clinical and other learning opportunities. In four of the five sites, most GME leaders felt that program directors can successfully make changes in how residents spend their time solely based on educational priorities. Only in one site did most leaders (including several program directors) imply that financial factors and staffing needs were the first and most compelling challenge a director would have to address in proposing a change to a program. For example, one program director had a difficult time answering our questions about how he might go about creating community-based learning opportunities for trainees because of the chronic undersupply of physicians and current excess demand for clinical time of trainees in his program.

The key internal entities driving decisions differed across sites, but a common theme was the relationship among hospital and medical school leaders and importance of individual people, regardless of their role. Respondents typically described the hospital and medical school as having different priorities. When asked how hospital and medical school leaders would rank the relative importance of education, research, and patient care, virtually all informants ranked patient care as the highest priority of the hospital while education and research are the highest priority of the medical school. In most cases, the resulting tension caused by these differing priorities is considered healthy and productive, but there are some ways in which it may cause

some problems. The tension can be exacerbated by differing levels of information about GME-related revenues, with medical school leaders often feeling unclear about revenue streams.

ACGME recently placed an 80-hour limit on resident work hours per week. This generally resulted in institution-wide, rather than program-specific, efforts to examine and choose appropriate responses. However, informants appear to agree that the implications of the 80-hour week differ across program specialties. For example, compared to pathology residents, residents in surgical specialties (including general surgery) tended to have longer work hours, and changing their work hours had larger implications for hospital capacity and finances. Thus, these two programs might think very differently about how to restructure resident time and whether to add residents to the program. Since all but one of the sites are already operating beyond their Medicare cap, that did not appear to affect the decision of how to reconfigure programs and training experiences in light of the 80-hour limit.

Most institutional leaders and program directors described strong commitments to monitoring and improving program quality. There are a number of new tools available to use in coordinating resident schedules, completion of competency requirements, and satisfaction with their training experience. They try to act promptly whenever residents express concern over the quality of attending physician oversight or other aspects of their training. These issues can be particularly tough to address when they involve rotations at other hospitals and sites. Several programs had recently undergone reorganization of some aspects of hospital leadership that was expected to improve GME oversight and management.

3.3 Characteristics of the U.S. Medical Resident Population

Program offerings are only one piece of the picture of graduate medical education. In this section, we review the population of residents that fills these programs. There have been dramatic changes over time in the demographic makeup of residents. We also examine trends in the specialties that residents seek out as they graduate from medical school, and how those choices are associated with gender and race.

Demographics

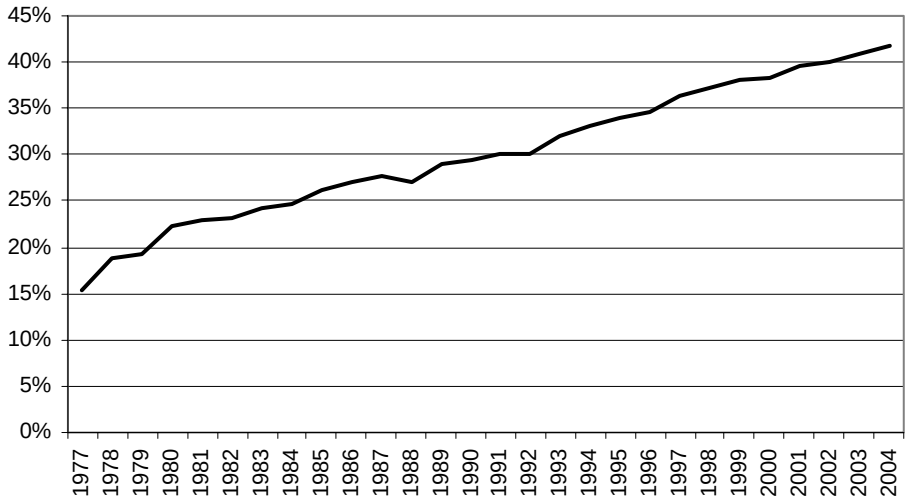
The gender and racial composition of the residents on duty has changed drastically since the late 1970s. These trends reflect broader societal trends in the demographics of students attending college, and particularly trends in students applying to and being accepted to medical school.

In 1977, only 15.4 percent of residents on duty were female, but in 2004, 41.8 percent of all residents on duty were female (Exhibit 3.3.1). In several specialties, females now represent the majority of resident physicians, such as in the fields of obstetrics and gynecology (74 percent female) and pediatrics (67 percent female). Women also constitute half of the residents in psychiatry and family medicine.

The racial composition of the resident population has also become more diverse (Exhibit 3.3.2). While nearly 80 percent of the residents on duty were reported as white in 1979, 55 percent were reported as white in 2004. Most of this change is accounted for by increased numbers of Asian and other ethnicity residents. In contrast, the Black resident composition has remained fairly fixed across the past two decades, ranging between five and six percent of the total resident population. Hispanics also make up about six percent of the resident population (JAMA, 2003; not shown). In our site visits, many leaders felt African Americans remain underrepresented in their programs. Several have worked actively to help develop a pipeline of minority students through their medical school's recruitment and admissions activities.

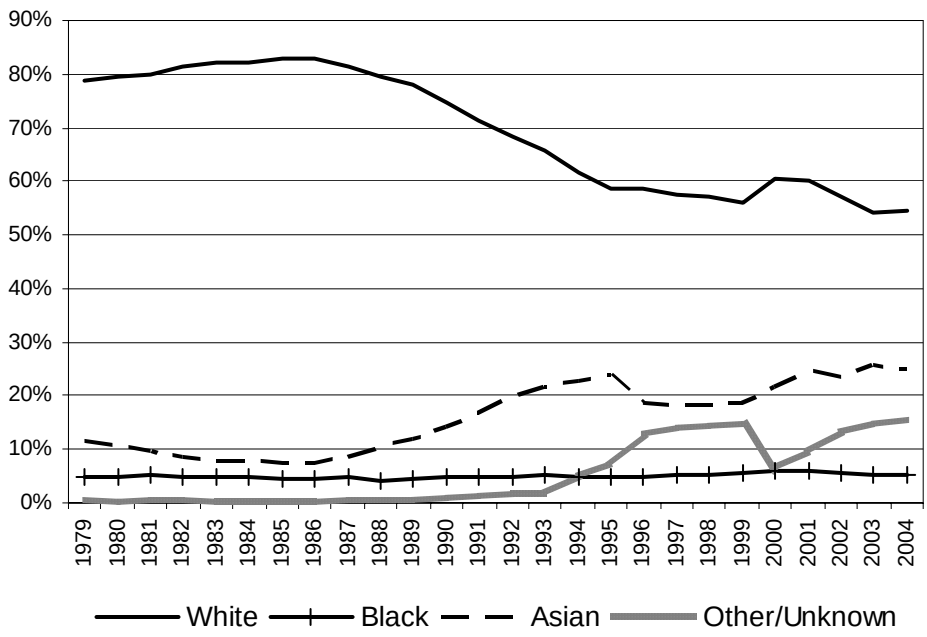
About three fourths of resident physicians are U.S. citizens: 63 percent native citizens and 11 percent naturalized citizens (Exhibit 3.3.3). Almost a tenth are classified as permanent residents of the United States (9 percent). Residents who have temporary worker or exchange visitor visas account for 2 percent and 5 percent of the resident population respectively. Very small percentages (half a percent or less) of residents possess student, temporary visitor, refugee/asylee/displaced person or other visas. Almost a tenth are of unknown citizenship or visa status. While some of these non-citizens may be graduates of international medical schools, others may have come to the United States for medical school or even earlier.

Exhibit 3.3.1 Female Residents, 1977-2004



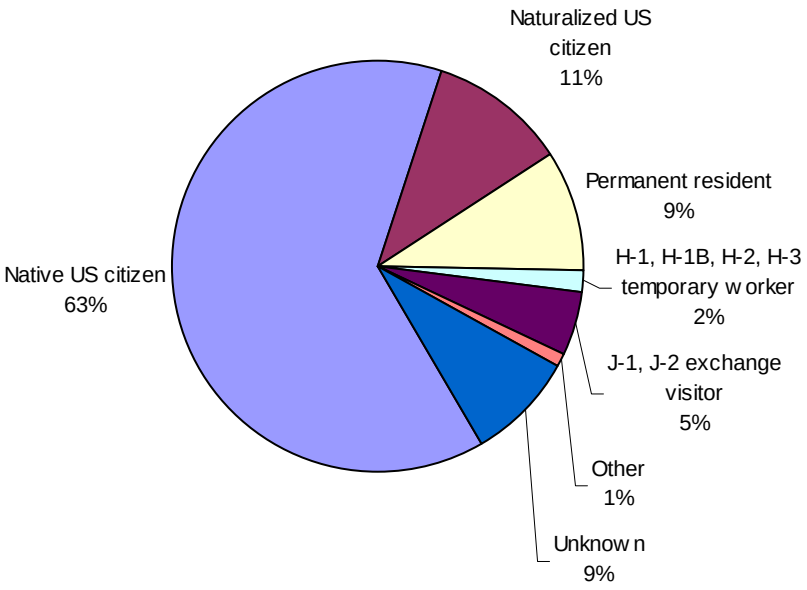
Source: NORC analysis of JAMA, 1992-2005; Rowley et al 1991 and 1990; Etzel 1989; Crowley et al 1980-1988

Exhibit 3.3.2 Residents by Race, 1979-2004



Source: NORC analysis of JAMA, 1992-2005; Rowley et al 1991 and 1990; Etzel 1989; Crowley et al 1980-1988

Exhibit 3.3.3 Distribution of Residents by Citizenship/Visa Status, 2002/2003

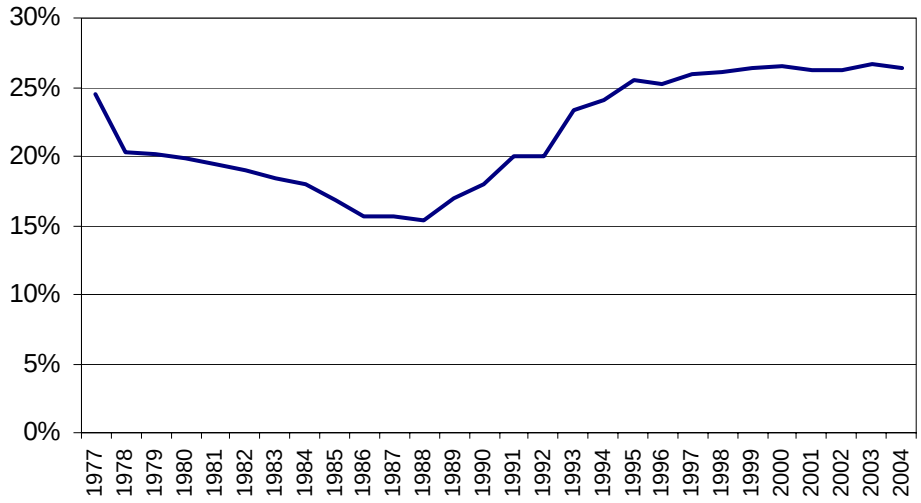


Source: JAMA, 2003

International Medical Graduates

The number of international medical graduates (IMGs) participating in U.S. residency programs has experienced fluctuations in the past thirty years (Exhibit 3.3.4). Between 1977 and 1988 the total percent of residents on duty who were IMGs fell gradually but consistently from 25 percent in 1977 to 15 percent in 1988. The percentage of IMGs began increasing again in 1989, and from 1995 to 2004 the percentage of residents who were IMGs was between 25 percent and 27 percent.

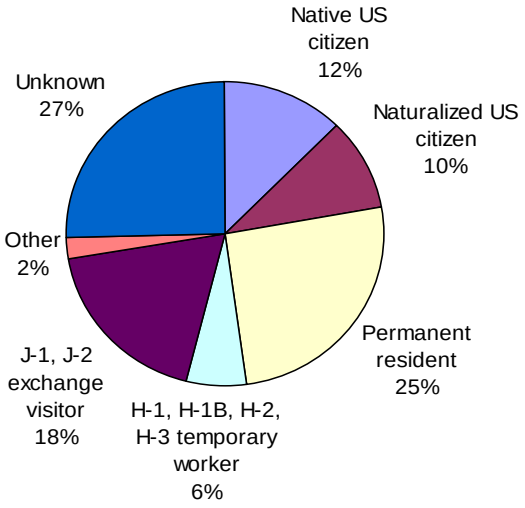
Exhibit 3.3.4 Percent of Residents Coming from International Medical Schools, 1977-2004



Source: NORC analysis of JAMA, 1992-2005; Rowley et al 1991 and 1990; Etzel 1989; Crowley et al 1988 and 1987

In 2002, among residents who graduated from international medical schools, one quarter were permanent residents, another quarter were U.S. citizens (either native or naturalized), and another quarter were of unknown citizenship or visa status (Exhibit 3.3.5). Of the remaining quarter, the majority possessed J-1 or J-2 exchange visitor visas (19 percent) and temporary visitor visas (6 percent). The remaining IMG residents possessed refugee/asylee/displaced person, student, temporary visitor, or other visas.

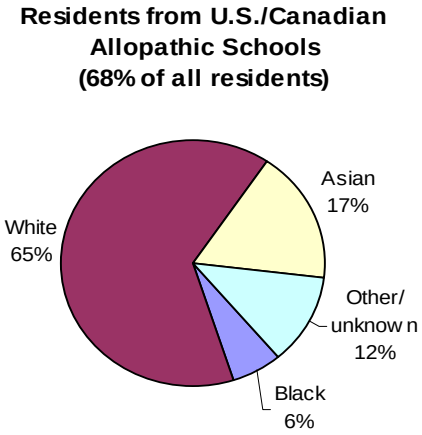
Exhibit 3.3.5 Citizenship/Visa Status of IMGs, 2002/2003

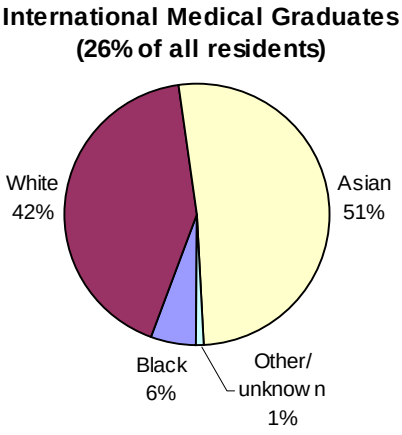


Source: JAMA, 2003.

As might be expected, the racial breakdown of residents is different among graduates of international medical schools than it is among U.S. and Canadian graduates (Exhibit 3.3.6). Whites represented nearly two-thirds of residents from medical schools in the United States, but just under a half of international medical graduates. Conversely, Asians make up about a fifth of U.S. medical graduates but just over half of international medical graduates. The proportion of graduates who are black is similar for both sets of schools (6 percent). Six percent of U.S. graduates are Hispanic, while 8 percent of international medical graduates undertaking their residency in the U.S. are Hispanic (JAMA, 2003; not shown in charts below).

Exhibit 3.3.6 Distribution of Resident Race, by Medical School Location, 2002/2003





Source: JAMA, 2003.
Note: Approximately 5 percent of all residents graduated from osteopathic schools, which are not included in these figures.

Specialty Choice and Post-Training Career Plans

The number of residents in each specialty is the result of the combined factors of program offerings and resident interest. For most specialties, a centralized process known as the National Resident Matching Program (NRMP) coordinates the process of matching prospective residents with residency program positions. In 2006, 3,888 U.S. residency programs participated in the NRMP offering 24,085 residency positions (NRMP "Table 10b", 2006). In addition to the NRMP, students can be matched through the military which runs its own separate match process for applicants from accredited U.S. medical schools who generally have an existing active duty obligation. The Army, Navy, and Air Force each conducts a separate match and requirements for active duty service vary among the three military divisions (ACGME "Section I", 2006).

Additional organizations run residency matches separate from the NRMP and the military match for programs in neurosurgery, ophthalmology, and urology. The American Osteopathic Association (AOA) conducts a secondary matching program for first year post graduate positions in osteopathic programs as combined internship/residency programs or internship programs. Another match is conducted by the American Urological Association (AUA) that, in 2006, matched 115 applicants to 109 non-military accredited urology residency programs (AUA, 2006). Finally, the SF Match is an advanced GME matching program that covers programs in neurological surgery (for post graduate year two), child neurology (for post graduate year three), ophthalmology (for post graduate year two), and plastic surgery. To qualify for participation in the plastic surgery match, an applicant must have completed three years of a surgical residency (SF Match, 2006).

Both U.S. medical graduates and IMGs are eligible to participate in the match; however, the latter is required to have passed all exams that grant them certification by the Education Commission of Foreign Medical Graduates. To be certified by the ECFMG®, IMGs must complete a medical science examination and a clinical skills examination, which test data gathering and communication skills or English proficiency. U.S. medical graduates typically apply to between five and ten residency programs, while IMGs are encouraged to apply to about twenty-five programs (NRMP, 2006).

In general, medical students apply to residency programs in the fall of their senior year of medical school, and interview with programs during the months of October through January.[10] In February of each year, medical students provide the match with ranked lists of their preferred programs, and residency programs provide ranked lists of their preferred students. In March, the match places students into the residency program highest on their list that still has a place for them after all students ranked higher by that program have been placed. One site visit participant asserted that programs have begun to interview students earlier in medical school, encouraging them to pick a specialty too early in their medical school experience. He feels that this has led to more residents failing to matriculate in their residency program or, in an effort to honor their commitment, following through with their original choice but changing specialty midway through their residency. Data from the NRMP gives some insight into the popularity of various specialties among graduating seniors (Exhibit 3.3.7). For example, in 2005, there were an

[10] The AOA Match and SF Match programs operate on a slightly earlier timeline so that applicants who do not match through these programs may submit applications to the NRMP.

average of more than two applicants per available position in plastic surgery and in general surgery.

Not all applicants to residency programs successfully match; every year there are a number of excess medical students who do not match if none of the programs an applicant has ranked has listed that applicant on its program's preferred student list. A student may also fail to match if he or she did not properly follow NRMP guidelines or deadlines or was withdrawn (e.g., if the applicant matched through a non-NRMP program) (NRMP 2006).

Similarly, if there are no matches between an applicant's preference list and a program's preference list, a program may have unfilled positions. In 2006, 7 percent of the 24,085 post graduate year one and two positions that were offered in the match were unfilled, although there were nearly ten applicants per available residency position (NRMP "Results and Data", 2006). For instance, for family medicine and combined programs in internal medicine and pediatrics there were slightly fewer applicants than available positions.

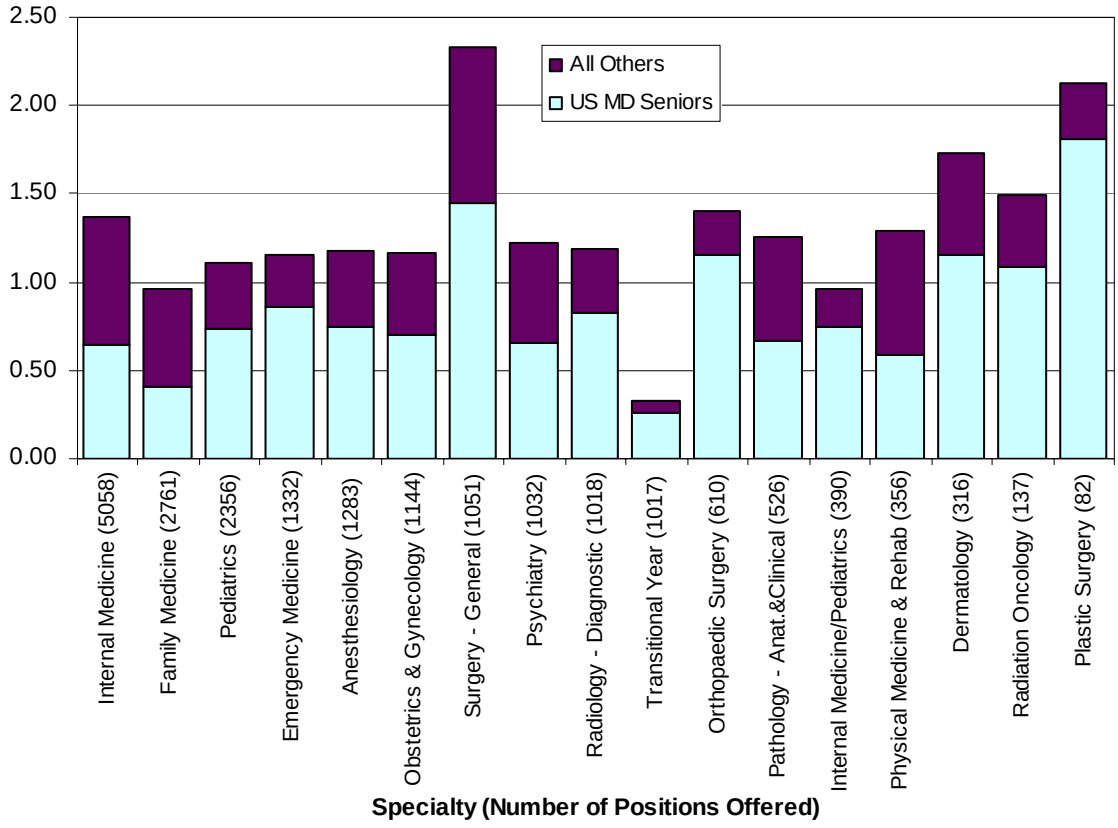
Unfilled residency program positions are listed on the Dynamic List of Unfilled Positions, which is posted by the NRMP the day after the Match results are announced. Unmatched students who qualify to view the list have two days to review the unfilled positions and apply to as many as 30 programs; this time period is referred to as the post-Match Scramble. During this time, applicants may also request that programs to which they have already applied review once more their applications if positions within the program have not been filled.

For those applicants who are successful in neither the regular Match nor the Scramble, the AAMC offers FindAResident—a resource for applicants to find positions that are not a part of the Electronic Residency Application Service (ERAS), NRMP, or the Scramble. These positions may be fellowships, off-cycle positions,or in other specialties whose programs do not participate in the NRMP Match. FindAResident is also used by residents who wish to change their programs and those who wish to do a fellowship. Most of the positions posted on FindAResident are PGY-1 (25%) and PGY-2 (46%) positions. In the four years that this resource has been available through the AAMC, positions in family medicine, internal medicine, pediatrics, and psychiatry have been the most commonly posted (AAMC "FindAResident," 2006).

A preliminary year in graduate medical training allows the resident to complete prerequisites for a specialized field. Sometimes this preliminary year is completed in a particular specialty; other residents may complete a generalized "transitional year" program. For transitional year programs, there were fewer than half as many applicants as positions offered.

However, many additional residents complete a preliminary year within a specialty. For example, 9 percent of all internal medicine residents, and 20 percent of all general surgery residents, were in a preliminary year in 2002/2003 (Exhibit 3.3.8). This is a sign that many of these residents may intend to subspecialize.

Exhibit 3.3.7 Applicants per Available Position, by Specialty and Positions Offered, 2005



Source: Jolly, 2006.
Note: "All others" includes U.S. graduates of osteopathic programs as well as graduates of international medical schools.

Exhibit 3.3.8 Residents Completing a Preliminary or Transitional Year

Specialty/Subspecialty	Residents Completing a Preliminary Year, 2002/2003
Internal medicine	1922
Surgery-general	1372
Family practice	52
Pediatrics	39
Obstetrics and gynecology	21
Anesthesiology	10
Psychiatry	4
Transitional year	1300
Total	4720

Source: JAMA, 2003.

Greater specialization and disinterest in primary care has been an ongoing trend in medicine. This has been attributed to many factors, including greater prestige and higher salaries (Donini-Lenhoff and Hedrick, 2000) as well as lifestyle characteristics such as more control over time and fewer working hours (Dorsey et al, 2003). In the interviews conducted for this study, medical program directors cited these trends as well as a desire of students to feel they have mastered their field, which is increasingly difficult for generalists as the content they are expected to cover continually grows.

Although they attract fewer residents per available position, primary care residency programs remain the largest programs. (Table 3.3.9). Nearly a third of all residents are in internal medicine and related subspecialties (31,540 residents in the 2005/2006 school year); a tenth are in the field of pediatrics and related subspecialties (10,714 residents), and another tenth are in family medicine and related subspecialties (9,986 residents). Three other specialties have more than 5,000 residents: surgery, psychiatry, and anesthesiology.

Exhibit 3.3.9 Resident Physicians: Total Number for the Top 10 Fields (By Number of Residents on Duty)

	Total Residents, 2005/2006	Total Residents, 2001/2002	Percent Change
Internal medicine and subspecialties	31,540	29,537	7%
Pediatrics and subspecialties	10,714	9,716	10%
Family medicine and subspecialties	9,986	10,249	-3%
Surgery-general and subspecialties	7,853	7,485	5%
Psychiatry and subspecialties	5,784	5,422	7%
Anesthesiology and subspecialties	5,500	4,867	13%
Radiology - diagnostic and subspecialties	4,816	4,212	14%
Obstetrics and Gynecology	4,797	4,646	3%
Emergency Medicine and subspecialties	4,349	3,798	15%
Orthopedic Surgery and subspecialties	3,524	3,247	9%

Source: NORC analysis of Accreditation Council for Graduate Medical Education, "Number of Accredited Programs by Academic Year (7/1/2006-6/30-2007)", Web Accreditation Data System, © ACGME 2005-2006.

These specialties have remained the largest programs in the past five years. However, anesthesiology, radiology (diagnostic) and emergency medicine have experienced more than three times the growth of fields like general surgery and obstetrics and gynecology (13-15 percent compared to 3-5 percent). Family medicine is the only field to show a decline in the number of residents over since the 2001/2002 school year, with 3 percent fewer residents.

Resident demographics can vary considerably by specialty (Exhibit 3.3.10). As discussed earlier, women now constitute a large majority of residents in pediatrics and obstetrics and gynecology. At the same time, there are very few women in some fields such as orthopedic surgery.

Exhibit 3.3.10 Gender, Race, Hispanic Origin, and IMG status of Medical Residents for the Top 10 Fields (By Number of Residents on Duty), 2002/2003

Specialty (including all subspecialties)	Female	White	Asian	Black	American Indian/ Alaskan Native/ Native Hawaiian/ Pacific Islander	Other/ Unknown	Hispanic Origin	IMG
Internal medicine	40%	47%	32%	5%	0%	15%	5%	39%
Family medicine	50%	59%	19%	7%	1%	15%	7%	32%
Pediatrics	67%	59%	21%	7%	1%	13%	7%	25%
Surgery-general	25%	60%	19%	6%	1%	14%	6%	18%
Anesthesiology	27%	61%	24%	4%	1%	10%	6%	26%
OB/GYN	74%	61%	15%	13%	1%	10%	8%	16%
Psychiatry	51%	55%	25%	7%	1%	12%	7%	37%
Radiology - diagnostic	25%	63%	25%	3%	0%	9%	5%	10%
Emergency Medicine	30%	73%	13%	5%	1%	8%	6%	4%
Orthopedic Surgery	9%	75%	12%	4%	1%	9%	3%	3%

Source: NORC analysis of JAMA, 2003.

In 2002/2003, whites constituted the majority of residents in all of the largest fields except internal medicine, which was heavily populated by Asians (32 percent) and those of other or unknown race (15 percent). In addition to internal medicine, Asians are heavily represented in psychiatry, radiology, and anesthesiology, where they comprise one quarter of the resident population. They are most heavily represented in the fields of rheumatology and pulmonary disease/critical care (39 percent; not shown). In contrast to Asians, residents identifying as Black, American Indian/Alaskan Native/Native Hawaiian/Pacific Islander, and Other/Unknown race constitute small percentages of the largest residency programs. Blacks are most heavily represented in obstetrics and gynecology, where they comprise 13 percent of residents. Pediatric hematology/oncology has the highest ratio of Hispanic residents (15 percent; not shown).

Canadian and other international medical graduates are more highly represented in certain fields than in others (Exhibit 3.3.11). IMGs comprise as much as half of the resident population for nuclear medicine, infectious disease, nephrology, pathology and pediatric hematology/oncology. This may be a sign that U.S. medical graduates find these fields unattractive for some reason. None of the sites we visited reported having large numbers of IMGs. Some program directors expressed a preference for U.S. medical graduates, and intimated that they would view relying on IMGs to fill their program slots as an indication that the program's quality was slipping.

Leaders reported that the administrative burden associated with non-citizen IMGs has increased in recent years, making it yet more difficult to recruit and employ them in a timely fashion.

Within individual institutions or programs, to the extent that institutional or program leaders have detected a shift in trainee career goals over the past decade, they tend to attribute it to changes in their institution and, therefore, who is attracted to it. For example, one site has gone through a major effort to improve its research activities and status as a research center. As a result, the fact that more of its trainees are interested in research careers (up to approximately 30 percent from perhaps 15 percent ten years ago) is taken as the effect of self-selection by medical students in the match process and not as a widespread increase in interest in research among medical school graduates.

Exhibit 3.3.11 Specialties with Largest Share of Canadian and International Medical Graduates, 2002/2003

Top Ten Programs for Canadian Medical Graduates, August 2002	% of All Resident Physicians	Top Ten Programs for IMGs, August 2002	% of All Resident Physicians
Colon and rectal surgery	1.7%	Internal Medicine	
Internal Medicine		Cardiovascular disease	41.9%
Interventional cardiology	1.4%	Endocrinology, diabetes, & metabolism	40.6%
Nephrology	3.3%	Geriatric medicine	40.0%
Oncology	4.1%	Infectious disease	52.3%
Pediatrics		Interventional cardiology	40.0%
Pediatric critical care medicine	2.1%	Nephrology	50.8%
Pediatric emergency medicine	1.6%	Oncology	42.1%
Pediatric hematology/oncology	1.1%	Neurology and subspecialties	41.0%
Pediatrics – other subspecialties	1.9%	Nuclear medicine	53.0%
Thoracic surgery	1.6%	Pathology-anatomic/clinical and subspecialties	50.4%
Combination Program		Pediatrics	
Internal Medicine/Pediatrics	2.3%	Pediatric hematology/oncology	48.4%

Source: JAMA, 2003.

Another trend in trainee career plans that some leaders have noticed relates to the type of practice arrangements that physicians expect to enter into. Some leaders think that trainees are more accepting of newer practice models, presumably because they are more familiar with them. As a result, they think trainees are more attracted to larger practices and accepting of managed care arrangements than they used to be.

Salaries

Resident physicians operate on a salary scale that is low compared to that of hospitalist physicians, physicians assistants and nurse practitioners who perform roles similar to the resident's (Weinstein; 2002). The salary typically increases for each year of training. In the 2005/2006 academic year, the average salary scale for residents in all regions at all types of hospitals was $41,900 for residents in the first year of training to $49,916 in the sixth year of training. There is some regional variation in pay for residents (Exhibit 3.3.12). Residents in the Northeast region of the United States have the highest salaries throughout their residency programs, while residents in the South appear to have the lowest. Residents at the sites reported that salary differences among programs did not play an important role in their decision-making

process – they assumed that each represented a living wage and none expected to be saving during their residencies.

In terms of variation by hospital type, the VA hospitals provide the highest resident stipends for all years. The VA hospitals are followed by church-affiliated hospitals, municipal hospitals, and other non-profit hospitals. State hospitals consistently have the lowest stipends for resident physicians.

The average year-to-year increase in resident salaries is $1,603. During our site visits, one resident felt that the pay scale should be more exponential after in the final years of training (after year three), as these residents can do certain procedures as well as any attending by that point in their education. The VA appears to take this into account, giving residents a raise of over $4,000 between their third and fourth years. The non-profit hospitals that train most residents tend, on average, to give a more steady increase across all years.

Exhibit 3.3.12 Median Resident Stipend, by Region and Type of Hospital, Academic Year 2005/2006

	Post-MD Year					
	1	2	3	4	5	6
All Regions, All Types	$41,900	$43,300	$45,000	$46,700	$48,360	$49,916
Northeast	$43,883	$46,167	$48,654	$50,902	$52,836	$54,543
South	$40,072	$41,372	$42,813	$44,586	$46,000	$47,793
Midwest	$41,818	$42,841	$44,475	$46,150	$47,500	$49,084
West	$40,512	$42,790	$45,185	$47,600	$50,268	$52,194
State	$39,933	$41,780	$43,000	$45,300	$47,496	$48,858
Municipal	$41,526	$42,452	$45,015	$48,090	$51,192	$54,123
Church	$42,817	$44,062	$45,919	$48,256	$51,107	$52,686
Other Non-Profit	$42,223	$43,900	$45,613	$47,198	$48,500	$50,000
VA	$42,427	$44,726	$47,130	$51,511	$53,029	$55,640
Medical School	$40,832	$42,659	$44,193	$45,998	$47,969	$49,152

Source: AAMC Survey of Housestaff Stipends, Benefits and Funding, Autumn 2005

Section 4: Respondent Policy Reflections and Suggestions for the Future

All site visit participants were asked to share their overall impressions of the GME system in the United States and any thoughts they had for improving it. Many responded that, while it could stand improvement, the U.S. approach was the "best in the world" by stressing clinical experience instead of didactic and other traditional classroom learning experiences.

At the same time, most decried the sense that residents were, in essence, subsidized hospital labor. They would prefer to have them discussed as students and learners, but fear that such a shift might remove residents from the hands-on learning that occurs in the clinical setting.

Several felt that the role of attending physicians should be better articulated, encouraged, and financially supported. At least one suggested that there should be a special training path for physician educators who are exposed to more extensive education theories and practices and then supported to help create innovation in resident training. Such education specialists could have a stronger voice in discussions of manpower planning and thinking about changes to the long education and training pipeline for physicians.

There was no common understanding of why Medicare is involved in GME financing. Most advocated revising the system to create an all-payer system so that private payers, in the words of one, "pull their weight." Upon probing, few respondents had specific ideas of how such a system would be designed and implemented, but they don't think that it makes sense for Medicare be the only explicit support of funding for residents.

A couple of informants raised issues related to education before and through medical school as salient to potential improvements to GME. For example, one raised the role of science in high schools as the place that innovation may need to take place, particularly as a way to get more African-American students interested in medicine. One suggested a broader integration of medical training into college-level education, bringing together people interested in any medical career (nursing, technicians, physicians, and so on) earlier and encouraging more flexible career paths over the life course.

Conversely, some looked beyond medical training and to the broader health care system as the locus for change. Many felt that some of the piecemeal aspects of GME funding and governance is inevitable given the fragmented insurance and medical care systems. They felt that it would be virtually impossible to make any significant changes in GME within the context of the current health care system, because there are so many connections between the balance of GME content and financing and the broader service provision and financing constructs.

The fact that actors within teaching institutions view balancing these tensions as complicated reflects estimates that the US GME system costs nearly $20 billion annually and involves over 100,000 residents and uncounted attending physicians. Over 8,000 programs are affiliated with over 1,000 hospitals nationwide – almost a third of the nations' hospitals. This large system continues to evolve, as evidenced by the changes in the number and mix of training programs

and residents in various specialties and the increase in female and non-white residents. However, it appears that changes in the practice and organization of medicine and broader societal shifts may have as large or a larger impact than specific efforts of policymakers to shape the size and content of the teaching enterprise.

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Appendix 2. Site Visit Discussion Guide

Verbal Consent

Before we get started, I just want to review the purpose of this discussion and to confirm that you are participating voluntarily. As we explained when we scheduled this meeting, we are working the for the Office of the Assistant Secretary for Planning and Evaluation at the US Department of Health and Human Services. They are interested in getting a better sense of the entire graduate medical education enterprise – not just the Medicare-supported piece. We are conducting site visits to a number of teaching hospitals and academic medical centers as part of a qualitative study to identify how hospital, medical school, and training program leaders perceive funding flows and the expectations of funders and accrediting bodies. As [informant's role], you are in a position to help us understand these issues within the context of [site name]. Your participation is voluntary and your responses will be kept confidential. Nothing you say will be attributed to you by name, nor will we share your name with ASPE. The final report will not identify participating sites by name but will contain a general description of each. Do you have any questions or concerns before we continue? [Answer questions] You can decline participating with no repercussions. Are you willing to participate in the discussion?

Introduction

Our goal through this visit is to understand the various components of the GME system and how they come together within a particular institution. In other words, we want to understand how GME is organized at your institution, the key funding streams for your programs, the external and internal forces that shape the programs, and how institution leaders reconcile the expectations and requirements of funders, accreditors, patients, and other constituencies. Ideally, we'd like to understand not only your impressions of the current status of these various factors within your institution, but any important recent changes and your sense how these factors are likely to change in the next few years, or how you would like to see things change in the future.

[Interviewer—to proceed with the discussion, you should have the following complete set of figures to record responses: Institution-specific schematic, Figure 1. Overall picture of GME funding, Figure 2. Major sources of funding, and Figure 3. Within organization transfer of funds]

****

DIO = Designated Institutional Officer (or Dean/VP/Director for GME)
RPD = Residency Program Director
FA = Financial Analyst
R = Resident

I. Organizational and Governance Structure

DIO To begin, we just want to take a few minutes to understand how the various parts of your organization fit together. These components might include entities such as the:

- University
- Medical School
- Faculty Practice Plan
- Primary Teaching Hospital
- Other Affiliated Hospitals
- Other Clinical (Community-Based) Sites

☐ We have tried to sketch out our current understanding of what these entities are for your organization and how they all interrelate. Can you take a look and tell me how this needs to be corrected?

DIO ☐ Do all of these component organizations share a **common ownership**?
☐ Are these component entities **for-profit, non-profit, government owned?**

DIO ☐ Do these component organizations share **common governance**?
Where does legal and financial control lie (for the medical school, the primary teaching hospital, the FPP, any affiliated clinical sites)?
☐ If not, are there explicit **mechanisms for coordinating** activities across them?

DIO ☐ Is the **FPP** part of the university/medical school, part of the teaching hospital, or a separate entity?

DIO ☐ Are all of the teaching **hospital affiliates part of the same health system**, or are they separate?

DIO ☐ What about the o**ther community-based clinical sites**?

DIO ☐ Describe your affiliations with the **VA, military, children's, and IHS** facilities.
☐ Are you sending your residents to these **sites for rotations**?

DIO ☐ Describe your affiliations with **other universities and academic entities**.

- ☐ Are these places sending their residents t**o this site for rotations**?
- ☐ Are these places sending **medical students or researchers/biomedical PhD** students?

DIO
- ☐ If you had to guess, which of the following is the institution's **highest priority:**
  Research
  Patient care
  Indigent care
  Undergraduate medical education
  Graduate medical education (GME)

- ☐ Which is the lowest?
- ☐ If not mentioned, where would do you think GME falls?

II. Sources and Distribution of GME Funding

FA, DIO, RPD?

We are trying to understand how your GME training programs are supported financially, including identifying the principal sources of funding and their relative importance to your organization, and understanding how GME money moves between different parts of your organization and to the training programs.

Let's start with trying to identify your major sources of support for GME…. [FIGURE 2]

- ☐ According to the org chart we discussed above (or developed w/your DIO), the key entities are {list}. What are the **GME funding sources** for each? What are the key **GME costs** they incur?

- ☐ Let's try to put these together into two simple schematics….
- ☐ [**overall picture** – FIG 1]
- ☐ [**within transfers** – FIG 3]

- ☐ What share of **total GME-related costs** do you think are covered by explicit GME funding from external sources?

- ☐ For each of the key GME funding sources, are you aware of **explicit goals** these funders have relative to the training of physicians?
- ☐ Is receipt of funds from any of these **sources tied to achievement** of explicit physician workforce goals of the funder? Other goals not related to physician workforce issues? Restricted to specific uses?
- ☐ What **mechanisms** are used by these funders to ensure that the funds are used to further these goals?

- ☐ Has this picture been relatively stable **over the past five years** or have there been significant changes in the relative importance of funding sources in recent years?
  What is the most volatile funding source?
  The most stable?

Some final funding details:

- ☐ What share, if any, of **attending physicians receive salary support** for their teaching time? About what percent of their time is supported for GME?
- ☐ What organizational entity is paying **residents' stipends**?
- ☐ Does the **Program Director receive direct support** (or protected time) for time spent on GME?
- ☐ Are any (other) **staff** receiving explicit support for GME activities?

III. Residents and Training Programs

DIO
- ☐ How many different **residency training programs** do you have?
- ☐ Has this number and specialty composition been **fairly constant** in recent years?
- ☐ If there has been a change, what factors led to the change?

DIO, RPD
- ☐ **How many residents** are currently in training in these programs?
- ☐ Were all of your available residency **slots filled** this year (i.e., the year *before* the 2006 match)?

FA
- ☐ How does your number of residency positions compare to the number allowed under the **Medicare cap?** In other words, do all of these residency positions qualify for Medicare funding? How many of the Medicare-funded positions qualify for 100% payments and how many receive only the 50% rate?

DIO, RPD
- ☐ What is the **demographic composition of your residents**?
- ☐ Approximate percent **female**?
- ☐ Percent **minority** (non-white)?
- ☐ Percent **IMG**?

DIO
- ☐ What about the **specialty distribution** of your residents: What percent are in medical specialties, surgical specialties, or hospital-based specialties such as anesthesiology?
- ☐ What percent are in **primary care vs. specialty training**? *(For Medicare payment purposes, primary care specialties include family medicine, general internal medicine, general pediatrics, preventive medicine, geriatric medicine, osteopathic general practice, and obstetrics/gynecology.)*

DIO, RPD
- ☐ Have there been any **significant changes** in recent years in the number of residents you have in training, the demographic composition of your trainees, or their specialty distribution?
- ☐ If so, what **factors** do you think might be driving these changes?

DIO, RPD
- ☐ What can you tell me about the **career goals** of your residents: What percent intend to focus mainly on patient care, vs. teaching, vs. research?
- ☐ Do you have any feel for whether your residents intend to practice in **rural or inner-city areas**?
- ☐ Where have your **recent classes** of residents tended to land after completing their certification?
- ☐ Have you seen any **changes in career goals** of residents in recent years? If so, what factors do you think might be driving these changes?

DIO, RPD
- ☐ How many **fellows** do you currently have in training at your institution (in your program)?

IV. Describing the Residency Training Experience

RPD, DIO
- ☐ Describe all of the **clinical rotations** that a resident in your program(s) would undertake.
  Other hospitals
  Community-based sites
  Rural
  Inner-city
- ☐ Do your training programs incorporate any rotations or other educational experiences designed to **spur interest in serving underserved** populations or communities?
- ☐ Are any rotations geared exclusively to **research**, rather than patient care experiences?

RPD, DIO
- ☐ What opportunities do your residents have to gain experience treating patients with relatively **routine problems vs. those with complex** or unusual problems?
- ☐ What opportunities do your residents have to gain experience with patients of **different cultural and ethnic** backgrounds?

RPD, DIO
- ☐ What opportunities do your residents have to participate in **seminars, research** studies, and other learning activities not directly involving patient care? Please describe these other types of activities.
- ☐ Are these activities requirements of the residency?
- ☐ Approximately what **percent of a resident's work time** is spent on direct patient care vs. research vs. other types of learning? Do you think this is an **appropriate balance**?

RPD, DIO
- ☐ Do you think the resident **training experience adequately prepares** physicians for the [types of patients they will see] / [situations they will encounter] in their regular (post-training) practice?
- ☐ What are the **strengths** of the way residency training is currently provided? The **weaknesses**?
- ☐ What types of **changes**, if any, would you recommend to the way training is provided so as to better prepare physicians?

V. Factors Affecting Residency Training Programs

RPD, DIO How do you balance the patient care, educational, and research opportunities and demands within your institution and in designing your trainees' activities?

- ☐ What **challenges and opportunities** arise because of the co-existence of these 3 missions?
- ☐ How do the patient care/safety net and research missions affect the structure and content of your residency training programs?
- ☐ How do your residency training activities affect the patient care and research missions?

RPD, DIO
- ☐ Let's think first about the **internal** factors, including money flows, that affect you and your program(s). [As program director]/[As the person in charge of GME], how much autonomy do you have in making decisions that shape the training experience of your residents?
- ☐ To what other **internal entities** are you accountable?
- ☐ How do these relationships affect your ability to make **decisions** about your

program(s)?

- ☐ Do you feel that this management/governing structure is **cohesive and supportive, or are there conflicting goals and signals**? How do you reconcile any competing pressures?
- ☐ Are there changes you would like to implement but that you have been **unable** to put in place due to these internal constraints?

RPD, DIO

- ☐ Now, please list the key organizations **external** to your institution that shape your training programs.

  Prompts:

  - *the Residency Review Committee[s]*
  - *the Institutional ReviewBoard*
  - *the Accreditation Council for GME (core competencies)*
  - *the American Board of Medical Specialties*
  - *GME and research funders*
  - *payers (Mcare, Mcaid, private insurers)*
  - *state regulators*
  - *other?*

- ☐ For each, what is the main (or top couple) **requirement/expectation** that you feel has the most direct effect on how your programs are organized?
- ☐ Of these various organizations, which ones seem the most **in concert with one another and which ones seem most at odds**?
- ☐ How do you reconcile these tensions?
- ☐ To what extent have any of these external organizations *limited* your ability to make changes to your programs that you thought would be beneficial?
- ☐ Have they created *opportunitie*s for you to change your programs?

RPD, DIO

ALTERNATIVE APPROACH IF HASN'T WORKED SO FAR:

- ☐ Let's look at this a different way. Consider **(1) financing; (2) (internal and external) governance; and (3) (Federal and state) policy** as three different domains. Within each of these domains, what are the key organizations and issues that are shaping your programs?
- ☐ How are these organizations/issues affecting your programs?
- ☐ Are these organizations/issues the same as, say, five years ago, or have there been important changes?
- ☐ What led to these changes and how have they affected your programs?
- ☐ How about in the coming few years – what do you see as the key opportunities and challenges in these areas (financing, governance, policy)?

DIO, RPD

- ☐ What would cause you to decide to **discontinue** an existing program or start a new one? Do you think that's likely to happen?

VI. Suggestions for the Future/Thoughts on GME Policy

DIO, RPD, R?	☐ What policy objectives do you think are important today regarding the physician workforce? *Prompts:* - *achieving the appropriate number and specialty mix of physicians* - *preparing physicians to serve culturally-diverse populations* - *ensuring an adequate supply of physicians for all areas of the country and all populations* - *improving the quality of patient care* - *reducing the cost of training the physician workforce*
DIO, RPD, R?	☐ Thinking broadly about how physicians are trained today, do you have any suggestions for ways that the overall GME system might be changed to achieve these policy goals? ☐ What about financing changes, specifically? Do you have any recommendations for ways to change GME financing to better achieve policy goals you think are important?
DIO, RPD, FA?, R?	☐ What do you think Medicare aims to accomplish through its financial support of GME? ☐ Does it achieve this? ☐ Are there ways that it reach its goals more effectively? ☐ What role do you think Medicare *should* play? Why?
DIO, RPD, FA, R?	☐ What do you think is the appropriate role of other GME funders? ☐ Do you think that all interests that are benefiting from the GME system are making an appropriately proportionate contribution to the support of that system? ☐ Do these other funders have explicit objectives regarding GME? What funding mechanisms are they using, and are these mechanisms tied to the objectives in any way?
DIO, RPD, R?	☐ Do you agree with the view that GME is a public good and thus should be financed through public support (Medicare and other payers, government financing, etc.)? ☐ Do you think GME could be financed privately, without government subsidies and intervention – e.g., through the work of residents who generate high revenue for their training facility and who accept low salaries during training as payment for the educational experience and the expected higher earnings that will follow after training?

DIO, RPD, FA, R?	☐ How would you feel about a revised system of GME financing that was more centralized and, arguably, more rational and explicit/transparent – namely an 'all payer' financing system? *There would be a single national fund to cover GME expenses – either financed collectively by all sources currently contributing to GME or through a government appropriation. Funds could be dispersed according to decisions made at the central level (e.g., in conjunction with national goals about the number of positions and specialty mix) or though a market-based voucher system that gave residents a fixed amount and permitted them to apply the voucher at any available training program that would accept them).* ☐ What would you see as the strengths and weaknesses of such a system?
DIO, RPD	☐ Should the U.S. be subsidizing the training of physicians who plan to practice outside the US?
DIO, RPD, R?	☐ Should there be a (further) redistribution of financial support toward primary care residency slots and away from specialty slots?
DIO, RPD	☐ What about the way support is provided when training takes place outside of hospital settings (or outside of settings typically associated with academic medical centers)? ☐ Should payment be made directly to these settings, or should it always go through an academic medical center?
DIO, RPD	☐ How can and should we be measuring the value of our investments in GME?
DIO, FA	☐ How important is Medicare GME funding to the ability of your facility to provide care to uninsured and underinsured patients? ☐ What other sources of financial support are available to [used by] your facility to cover uncompensated care costs? ☐ Would you be in favor of a more explicit funding mechanism that disentangles the cross subsidization of these costs and provides direct support for your safety net mission?

VII. Wrap Up

ALL	☐ Thinking about everything we've discussed today, what else should I have asked you about that we didn't cover? What have I missed? Are there GME-related issues that keep you up at night?
ALL	☐ Just to let you know, we are also speaking with ____ about ____. In the interest of time, I haven't focused on these issues with you. Do you have any information that you would like to share with us on those topics?
ALL	☐ Would you mind if we follow up with you later if we get back to the office and have further questions? *Make sure we have contact information, including full mailing address so we can send thank you note.*

Discussions with Current Medical Residents

Ask residents to sign in as they arrive for the lunch – need a mailing address so we can send them a thank you note. Also, phone number or email in case we need to follow up later.

R
- ☐ What program are you in?
- ☐ How many years of residency training are required for your first board eligibility?
- ☐ What year of training are you in now?
- ☐ Do you plan to pursue sub-specialization?

R ☐ What are your current career plans upon completion of residency training?

R
- ☐ What types of rotations have you had so far?
- ☐ What else is in store?

R ☐ Have there been any aspects of the training experience so far that have been a surprise to you/opened your eyes to new opportunities/changed your career plans?

R ☐ Are you providing care for the same types of patients you expect to be seeing when you are in your own practice (or are the patients more acutely-ill and

atypical – i.e., not what they're likely to see in an office practice)?
- ☐ Are you gaining experience with patients from a variety of cultures and/or ethnic backgrounds?

R
- ☐ How much of your work time do you spend in direct patient care?
- ☐ Do you have adequate time/opportunities to pursue other learning outside of patient care (e.g., seminars, research, self-directed learning)?
- ☐ Describe these other learning opportunities.
- ☐ Are these other activities required?
- ☐ Is there an adequate balance in your <u>work life</u> between all of the activities you are expected to undertake as a resident? Between all of the professional activities that you want to pursue due to your own interests?

R
- ☐ Do you feel that you are going to be adequately prepared for your board exams at the end of your training period?
- ☐ For your chosen career path?

R
- ☐ How has the size and composition of your training cohort affected your training experience?
- ☐ Are there any aspects of it that you wish had been different?

Similarities/differences re: demographics, career goals, previous experience

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R
- ☐ What has been the best part of your residency training experience?
- ☐ The worst?

R
- ☐ What changes, if any, would you recommend to the way residency training is provided?

Appendix 3. Detailed Data Tables

Table C.1 Number of Programs, Residents, and Residents per Program, 1980-2004

Year	Total No. of Programs	% change	Residents on Duty	% change	Residents per Program
1980	4,588	--	61,456	--	13.4
1981	4,742	3%	69,738	13%	14.7
1982	4,573	-4%	70,523	1%	15.4
1983	4,759	4%	72,397	3%	15.2
1984	4,811	1%	75,125	4%	15.6
1985	4,799	0%	74,514	-1%	15.5
1986	6,332	32%	76,815	3%	12.1
1987	6,319	0%	81,410	6%	12.9
1988	6,443	2%	81,093	0%	12.6
1989	6,591	2%	85,330	5%	10.9
1990	6,938	5%	82,902	-3%	11.9
1991	7,189	4%	86,217	4%	12.0
1992	7,065	-2%	89,368	4%	12.6
1993	7,277	3%	97,370	9%	13.4
1994	7,347	1%	97,832	0%	13.3
1995	7,657	4%	98,035	0%	12.8
1996	7,787	2%	98,076	0%	12.6
1997	7,861	1%	98,143	0%	12.5
1998	7,892	0%	97,383	-1%	12.3
1999	7,946	1%	97,989	1%	12.3
2000	7,985	0%	96,806	-1%	12.1
2001	8,025	1%	96,410	0%	12.0
2002	8,064	0%	98,258	2%	12.2
2003	8,192	2%	99,964	2%	12.2
2004	8,246	1%	101,291	1%	12.3

Source: JAMA, 1992-2005; Rowley et al 1991 and 1990; Etzel 1989; Crowley et al 1988 and 1987
Note: Number of residents in 1989 adjusted to estimate actual number because of underreporting.

Table C.2 Number of Programs, Residents, and Residents per Program, by Specialty, 2005/06

	Number of Programs	Number of Positions Filled	Filed Positions/ Program
Allergy and immunology and subspecialties	73	279	3.8
Anesthesiology and subspecialties	314	5,500	17.5
Colon and rectal surgery	43	75	1.7
Dermatology and subspecialties	189	1,158	6.1
Emergency medicine and subspecialties	172	4,349	25.3
Family medicine and subspecialties	583	9,986	17.1
Medical genetics and subspecialties	63	91	1.4
Internal medicine	388	22,160	57.1
Cardiovascular disease	152	1,263	8.3
Endocrinology, diabetes, and metabolism	137	1,294	9.4
Gastroenterology	172	2,230	13.0
Geriatric medicine	122	488	4.0
Hematology or Hematology and oncology	158	1,253	7.9
Infectious disease	103	322	3.1
Interventional cardiology	141	654	4.6
Nephrology	127	269	2.1
Oncology	134	802	6.0
Pulmonary disease or Pulm./critical care medicine	19	138	7.3
Rheumatology	108	380	3.5
Internal Medicine - other subspecialties	117	287	2.5
Neurological surgery	97	805	8.3
Neurology and subspecialties	330	2,115	6.4
Nuclear medicine	61	160	2.6
Obstetrics and gynecology	252	4,797	19.0
Ophthalmology	117	1,361	11.6
Orthopaedic surgery and subspecialties	343	3,524	10.3
Otolaryngology and subspecialties	123	1,371	11.1
Pathology-anatomic and clinical and subspecialties	517	2,820	5.5
Pediatrics	204	7,994	39.2
Neonatal-perinatal medicine	98	547	5.6
Pediatric cardiology	49	286	5.8
Pediatric critical care medicine	60	330	5.5
Pediatric emergency medicine	45	245	5.4
Pediatric endocrinology	68	207	3.0
Pediatric hematology/oncology	61	331	5.4
Pediatrics - other subspecialties	280	774	2.8
Physical medicine/rehabilitation and subspecialties	114	1,242	10.9
Plastic surgery and subspecialties	109	609	5.6
Preventive medicine and subspecialties	80	358	4.5
Psychiatry and subspecialties	464	5,784	12.5
Radiology-diagnostic and subspecialties	472	4,816	10.2
Radiation oncology	81	543	6.7
Surgery-general and subspecialties	464	7,853	16.9
Thoracic surgery	88	312	3.5
Urology and subspecialties	139	998	7.2
Sleep medicine	25	30	1.2
Combo - Neurology with other specialties	2	10	5.0
Combo - Pediatrics with other specialties	31	137	4.4
Combo - Psychiatry with other specialties	20	85	4.3
Combo - Internal Medicine with other specialties	61	282	4.6
Transitional year	130	1,282	9.9
TOTAL	**8,300**	**104,986**	**12.6**

Source: ACGME, "Number of Accredited Programs by Academic Year (7/1/2006-6/30-2007)", Web Accreditation Data System, © ACGME 2005-2006.

Table C.3 Change in Number of Programs and Number of Residents, by Specialty, 2001-2005

	Number of Programs			Number of Positions Filled		
	Number in 2005/06	Change since 2001/02	% change	Number in 2005/06	Change since 2001/02	% change
Allergy and immunology and subspecialties	73	-10	-12%	279	34	14%
Anesthesiology and subspecialties	314	-10	-3%	5,500	633	13%
Colon and rectal surgery	43	8	23%	75	13	21%
Dermatology and subspecialties	189	41	28%	1,158	193	20%
Emergency medicine and subspecialties	172	21	14%	4,349	551	15%
Family medicine and subspecialties	583	8	1%	9,986	-263	-3%
Medical genetics and subspecialties	63	14	29%	91	13	17%
Internal medicine	388	-3	-1%	22,160	755	4%
Cardiovascular disease	172	-6	-3%	2230	225	11%
Endocrinology, diabetes, and metabolism	122	5	4%	488	80	20%
Gastroenterology	158	2	1%	1253	206	20%
Geriatric medicine	103	6	6%	322	2	1%
Hematology or Hematology and oncology	137	2	1%	1294	236	22%
Infectious disease	141	3	2%	654	75	13%
Interventional cardiology	127	45	55%	269	113	72%
Nephrology	134	6	5%	802	103	15%
Oncology	19	-9	-32%	138	-49	-26%
Pulmonary disease or Pulm./critical care medicine	152	-1	-1%	1263	144	13%
Rheumatology	108	0	0%	380	60	19%
Internal Medicine - other subspecialties	117	9	8%	287	53	23%
Neurological surgery	97	3	3%	805	82	11%
Neurology and subspecialties	330	62	23%	2,115	473	29%
Nuclear medicine	61	-6	-9%	160	21	15%
Obstetrics and gynecology	252	-3	-1%	4,797	151	3%
Ophthalmology	117	-5	-4%	1,361	33	2%
Orthopaedic surgery and subspecialties	343	16	5%	3,524	277	9%
Otolaryngology and subspecialties	123	6	5%	1,371	299	28%
Pathology-anatomic and clinical and subspecialties	517	21	4%	2,820	446	19%
Pediatrics	204	-5	-2%	7,994	320	4%
Neonatal-perinatal medicine	98	-2	-2%	547	78	17%
Pediatric cardiology	49	4	9%	286	74	35%
Pediatric critical care medicine	60	1	2%	330	72	28%
Pediatric emergency medicine	45	6	15%	245	62	34%
Pediatric endocrinology	68	7	11%	207	73	54%
Pediatric hematology/oncology	61	0	0%	331	78	31%
Pediatrics - other subspecialties	280	35	14%	774	241	45%
Physical medicine/rehabilitation and subspecialties	114	11	11%	1,242	112	10%
Plastic surgery and subspecialties	109	2	2%	609	67	12%
Preventive medicine and subspecialties	80	-8	-9%	358	-61	-15%
Psychiatry and subspecialties	464	23	5%	5,784	362	7%
Radiology-diagnostic and subspecialties	472	14	3%	4,816	604	14%
Radiation oncology	81	4	5%	543	77	17%
Surgery-general and subspecialties	464	14	3%	7,853	368	5%
Thoracic surgery	88	-3	-3%	312	21	7%
Urology and subspecialties	139	3	2%	998	5	1%
Sleep medicine	25	25	new	30	30	new
Combo - Neurology with other specialties	2	-3	-60%	10	9	900%
Combo - Pediatrics with other specialties	31	5	19%	137	48	54%
Combo - Psychiatry with other specialties	20	0	0%	85	22	35%
Combo - Internal Medicine with other specialties	61	-5	-8%	282	46	19%
Transitional year	130	-8	-6%	1,282	-46	-3%
TOTAL	**8,300**	**235**	**3%**	**104,986**	**6,161**	**6%**

Source: Accreditation Council for Graduate Medical Education, "Number of Accredited Programs by Academic Year (7/1/2006-6/30-2007)", Web Accreditation Data System, © ACGME 2005-2006.

Table C.4 Change in Number of Programs and Number of Residents, by Specialty and Subspecialty, 2001-2005

Specialty	Subspecialty	Number of Programs, 2005/06 school year	Change since 2001/02 school year	% change
Family medicine	Family medicine	466	-31	-6%
Allergy and immunology	Clinical and laboratory immunology	1	-10	-91%
Preventive medicine	Preventive medicine	75	-10	-12%
Pathology-anatomic and clinical	Neuropathology	35	-9	-20%
Hematology or Hematology and oncology	Hematology	12	-9	-43%
Oncology	Oncology	19	-9	-32%
Pulmonary	Pulmonary disease	25	-8	-24%
Anesthesiology	Pain medicine	90	-8	-8%
Transitional year	Transitional year	130	-8	-6%
Nuclear medicine	Nuclear medicine	61	-6	-9%
Cardiovascular disease	Cardiovascular disease	172	-6	-3%
Pathology-anatomic and clinical	Forensic pathology	39	-5	-11%
Ophthalmology	Ophthalmology	117	-5	-4%
Pediatrics	Pediatrics	204	-5	-2%
Orthopaedic surgery	Pediatric orthopaedics	22	-3	-12%
Radiology-diagnostic	Vascular and interventional radiology	99	-3	-3%
Thoracic surgery	Thoracic surgery	88	-3	-3%
Pathology-anatomic and clinical	Pathology-anatomic and clinical	152	-3	-2%
Radiology-diagnostic	Radiology-diagnostic	190	-3	-2%
Obstetrics and gynecology	Obstetrics and gynecology	252	-3	-1%
Anesthesiology	Anesthesiology	129	-3	-2%
Internal medicine	Internal medicine	388	-3	-1%
Pathology-anatomic and clinical	Chemical pathology	3	-2	-40%
Psychiatry	Geriatric psychiatry	60	-2	-3%
Pediatrics - other subspecialties	Pediatric nephrology	35	-2	-5%
Neonatal-perinatal medicine	Neonatal-perinatal medicine	98	-2	-2%
Urology	Urology	119	-2	-2%
Physical medicine and rehabilitation	Physical medicine and rehabilitation	79	-2	-2%
Surgery-general	Surgery-general	252	-2	-1%
Radiology-diagnostic	Nuclear radiology	21	-1	-5%
Internal Medicine - other subspecialties	Sports medicine	1	-1	-50%
Pathology-anatomic and clinical	Blood banking/transfusion medicine	48	-1	-2%
Surgery-general	Hand surgery	2	-1	-33%
Psychiatry	Addiction psychiatry	43	-1	-2%
Anesthesiology	Critical care medicine	52	-1	-2%
Medical genetics	Medical genetics	48	-1	-2%
Internal Medicine - other subspecialties	Critical care medicine	31	-1	-3%
Psychiatry	Child and adolescent psychiatry	114	-1	-1%
Orthopaedic surgery	Orthopaedic surgery	151	-1	-1%
Psychiatry	Psychiatry	181	-1	-1%
Pathology-anatomic and clinical	Pediatric pathology	26	0	0%
Emergency medicine	Sports medicine	3	0	0%
Plastic surgery	Hand surgery	14	0	0%
Orthopaedic surgery	Orthopaedic surgery of the spine	12	0	0%

Specialty	Subspecialty	Number of Programs, 2005/06 school year	Change since 2001/02 school year	% change
Pediatrics - other subspecialties	Adolescent medicine	25	0	0%
Pediatrics - other subspecialties	Pediatric pulmonology	46	0	0%
Pediatrics - other subspecialties	Pediatric gastroenterology	50	0	0%
Allergy and immunology	Allergy and immunology	72	0	0%
Pediatric hematology/oncology	Pediatric hematology/oncology	61	0	0%
Rheumatology	Rheumatology	108	0	0%
Plastic surgery	Plastic surgery	90	0	0%
Otolaryngology	Otolaryngology	103	0	0%
Physical medicine and rehabilitation	Spinal cord injury medicine	20	1	5%
Pathology-anatomic and clinical	Medical microbiology	12	1	9%
Psychiatry	Pain medicine	1	1	
Emergency medicine	Undersea and Hyperbaric Medicine	1	1	
Preventive medicine	Undersea and hyperbaric medicine	1	1	
Orthopaedic surgery	Musculoskeletal oncology	9	1	13%
Preventive medicine	Medical toxicology	4	1	33%
Otolaryngology	Pediatric otolaryngology	5	1	25%
Surgery-general	Pediatric surgery	31	1	3%
Orthopaedic surgery	Hand surgery	53	1	2%
Pediatric critical care medicine	Pediatric critical care medicine	60	1	2%
Plastic surgery	Craniofacial surgery	5	2	67%
Radiology-diagnostic	Cardiothoracic radiology	2	2	
Orthopaedic surgery	Orthopaedic trauma	7	2	40%
Pediatrics - other subspecialties	Pediatric sports medicine	8	2	33%
Anesthesiology	Pediatric anesthesiology	43	2	5%
Surgery-general	Vascular surgery	94	2	2%
Pediatrics - other subspecialties	Pediatric infectious diseases	62	2	3%
Gastroenterology	Gastroenterology	158	2	1%
Radiology-diagnostic	Endovascular surgical neuroradiology	3	3	
Radiology-diagnostic	Pediatric radiology	46	3	7%
Orthopaedic surgery	Foot and ankle orthopaedics	6	3	100%
Radiology-diagnostic	Musculoskeletal radiology	11	3	38%
Orthopaedic surgery	Adult reconstructive orthopaedics	18	3	20%
Pathology-anatomic and clinical	Cytopathology	85	3	4%
Radiology-diagnostic	Neuroradiology	88	3	4%
Neurology	Child neurology	69	3	5%
Infectious disease	Infectious disease	141	3	2%
Neurological surgery	Neurological surgery	97	3	3%
Physical medicine and rehabilitation	Pediatric rehabilitation	4	4	
Neurology	Pain medicine	4	4	
Emergency medicine	Medical toxicology	21	4	24%
Dermatology	Dermatopathology	46	4	10%
Pediatric cardiology	Pediatric cardiology	49	4	9%
Radiation oncology	Radiation oncology	81	4	5%
Neurology	Neurology	121	4	3%
Urology	Pediatric urology	20	5	33%
Otolaryngology	Neurotology	15	5	50%
Emergency medicine	Pediatric emergency medicine	12	5	71%
Pediatrics - other subspecialties	Pediatric rheumatology	26	5	24%

Specialty	Subspecialty	Number of Programs, 2005/06 school year	Change since 2001/02 school year	% change
Endocrinology, diabetes, and metabolism	Endocrinology, diabetes, and metabolis	122	5	4%
Pathology-anatomic and clinical	Hematology	77	6	8%
Neurology	Clinical neurophysiology	91	6	7%
Pediatric emergency medicine	Pediatric emergency medicine	45	6	15%
Geriatric medicine	Geriatric medicine	103	6	6%
Nephrology	Nephrology	134	6	5%
Dermatology	Dermatology	112	6	6%
Neurology	Neuromuscular medicine	7	7	
Psychiatry	Forensic psychiatry	45	7	18%
Radiology-diagnostic	Abdominal radiology	12	7	140%
Pediatric endocrinology	Pediatric endocrinology	68	7	11%
Pulmonary	Pulmonary disease and critical care me	127	7	6%
Neurology	Neurodevelopmental disabilities	8	8	
Physical medicine and rehabilitation	Pain medicine	11	8	267%
Colon and rectal surgery	Colon and rectal surgery	43	8	23%
Orthopaedic surgery	Orthopaedic sports medicine	65	10	18%
Internal Medicine - other subspecialties	Clinical cardiac electrophysiology	85	11	15%
Hematology or Hematology and oncology	Hematology and oncology	125	11	10%
Emergency medicine	Emergency medicine	135	11	9%
Family medicine	Geriatric medicine	36	13	57%
Surgery-general	Surgical critical care	85	14	20%
Medical genetics	Molecular genetic pathology	15	15	
Psychiatry	Psychosomatic medicine	20	20	
Sleep medicine	Sleep medicine	25	25	
Family medicine	Sports medicine	81	26	47%
Pediatrics - other subspecialties	Developmental-behavioral pediatrics	28	28	
Neurology	Vascular neurology	30	30	
Dermatology	Procedural dermatology	31	31	
Pathology-anatomic and clinical	Selective pathology	40	31	344%
Interventional cardiology	Interventional cardiology	127	45	55%

Source: Accreditation Council for Graduate Medical Education, "Number of Accredited Programs by Academic Year (7/1/2006-6/30-2007)", Web Accreditation Data System, © ACGME 2005-2006.

Table C.5 Characteristics of Teaching Hospitals, by Number of Residents and Residents per Bed

	Hospitals	Total Residents	Average Daily Census	Average DSH %	Average Medicare %	Average Wage Index
Hospitals with 0 residents	2579		66	25%	53%	0.96
Hospitals with >0 residents	1098	80,138	211	31%	42%	1.04
By estimated number of residents						
>0 but <1	59	35	101	23%	47%	1.05
1-10	298	1,429	126	26%	47%	1.01
10-50	381	9,259	176	28%	45%	1.01
50-100	119	8,465	230	33%	40%	1.07
100-200	114	15,876	322	38%	37%	1.07
200-300	61	15,256	355	46%	31%	1.09
300-400	25	8,655	424	42%	31%	1.12
400-500	24	10,669	498	43%	28%	1.08
500-1000	16	9,401	681	38%	31%	1.10
>1000	1	1,093	1464	48%	32%	1.32
By resident-to-bed ratio						
>0 but <0.01	163	306	152	25%	45%	1.03
0.02-0.05	215	2,050	171	27%	48%	1.00
0.06-0.10	206	4,047	167	27%	46%	1.00
0.11-0.25	216	11,741	220	28%	43%	1.04
0.25-0.5	164	20,202	254	36%	38%	1.08
0.5-0.75	98	27,997	346	48%	31%	1.09
0.75-1.0	33	12,746	365	43%	29%	1.09
>1.0	3	1,049	259	32%	27%	1.09
Total, All Hospitals	**3677**	**80,138**	**110**	**27%**	**49%**	**0.98**

Source: NORC analysis of FY2007 IPPS Impact File, based on March 2006 MEDPAR and Provider Specific File, and FY2003/2004 Cost Report Data.

Note: Estimated number of residents per hospital is derived from the resident-to-bed ratio and number of beds for each hospital; may not reflect the actual number of residents in some cases.

Table C.6 Programs, Hospitals, and Residents, by Region and State

Region and State	Programs	% of All Programs	Teaching Hospitals	% of All Teaching Hosptials	Residents	% of All Residents
New England, subtotal	**635**	**8%**	**64**	**6%**	**8,086**	**8%**
Connecticut	156	2%	17	2%	1,877	2%
Maine	19	0%	6	1%	260	0%
Massachusetts	341	4%	32	3%	4,704	5%
New Hampshire	36	0%	3	0%	315	0%
Rhode Island	54	1%	5	0%	683	1%
Vermont	29	0%	1	0%	247	0%
Middle Atlantic, subtotal	**1760**	**22%**	**214**	**19%**	**24,169**	**24%**
New Jersey	171	2%	43	4%	2,425	2%
New York	1059	13%	100	9%	14,941	15%
Pennsylvania	530	7%	71	6%	6,803	7%
East North Central, subtotal	**1335**	**17%**	**212**	**19%**	**16,800**	**17%**
Illinois	399	5%	60	5%	5,435	5%
Indiana	95	1%	21	2%	1,197	1%
Michigan	305	4%	49	4%	4,086	4%
Ohio	388	5%	56	5%	4,631	5%
Wisconsin	148	2%	26	2%	1,451	1%
West North Central, subtotal	**537**	**7%**	**96**	**9%**	**6,356**	**6%**
Iowa	72	1%	17	2%	743	1%
Kansas	48	1%	11	1%	612	1%
Minnesota	149	2%	18	2%	1,958	2%
Missouri	207	3%	29	3%	2,311	2%
Nebraska	47	1%	12	1%	540	1%
North Dakota	7	0%	5	0%	103	0%
South Dakota	7	0%	4	0%	89	0%
South Atlantic, subtotal	**1315**	**17%**	**135**	**12%**	**15,317**	**15%**
Delaware	17	0%	2	0%	260	0%
District of Columbia	158	2%	6	1%	1,728	2%
Florida	242	3%	39	4%	2,852	3%
Georgia	151	2%	17	2%	1,888	2%
Maryland	207	3%	14	1%	2,568	3%
North Carolina	225	3%	16	1%	2,551	3%
South Carolina	76	1%	9	1%	968	1%
Virginia	187	2%	22	2%	1,990	2%
West Virginia	52	1%	10	1%	512	1%
East South Central, subtotal	**386**	**5%**	**55**	**5%**	**4,344**	**4%**
Alabama	102	1%	17	2%	1,087	1%
Kentucky	86	1%	18	2%	966	1%
Mississippi	42	1%	3	0%	489	0%
Tennessee	156	2%	17	2%	1,802	2%
West South Central, subtotal	**736**	**9%**	**107**	**10%**	**9,169**	**9%**
Arkansas	56	1%	12	1%	618	1%
Louisiana	143	2%	19	2%	1,658	2%
Oklahoma	58	1%	16	1%	632	1%
Texas	479	6%	60	5%	6,261	6%

Region and State	Programs	% of All Programs	Teaching Hospitals	% of All Teaching Hosptials	Residents	% of All Residents
Mountain, subtotal	**295**	**4%**	**58**	**5%**	**3,455**	**3%**
Arizona	84	1%	16	1%	1,076	1%
Colorado	84	1%	17	2%	1,058	1%
Idaho	4	0%	4	0%	43	0%
Montana	3	0%	2	0%	17	0%
Nevada	10	0%	3	0%	187	0%
New Mexico	49	1%	8	1%	472	0%
Utah	59	1%	6	1%	568	1%
Wyoming	2	0%	2	0%	34	0%
Pacific, subtotal	**903**	**11%**	**144**	**13%**	**11,701**	**12%**
Alaska	1	0%	1	0%	23	0%
California	696	9%	110	10%	9,117	9%
Hawaii	31	0%	6	1%	394	0%
Oregon	62	1%	9	1%	682	1%
Washington	113	1%	18	2%	1,485	1%
Puerto Rico	**66**	1%	13	1%	779	1%
Total	**7968**	**100%**	**1098**	**100%**	**100,176**	**100%**

Source: NORC Analysis of CMS Impact File for FY2007 Inpatient PPS (Hospitals); Accreditation Council for Graduate Medical Education. "Resident Physician Population by Specialty and State, Academic Year 2003-2004" Web Accreditation Data System. © ACGME 2005-2006

Table C.7 Regional Distribution of Residents, 1979-2004

	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Moutain	Pacific	Puerto Rico
1979	15.2	20.4	4.1	11.4	5.0	10.7	5.5	20.8	1.8	0.0
1980	23.2	18.1	6.8	15.0	4.6	8.6	3.3	12.4	0.9	0.0
1981										
1982	23.8	17.7	7.0	14.5	4.4	8.6	3.2	12.4	1.0	0.0
1983	23.7	17.7	7.1	14.6	4.2	8.9	3.2	12.2	1.1	0.0
1984										
1985										
1986	23.5	17.4	7.1	14.8	4.4	9.2	3.2	12.0	1.0	0.0
1987	23.7	17.2	6.8	15.2	4.3	8.7	3.2	12.3	1.1	0.0
1988	24.0	16.7	7.2	15.3	4.5	8.8	3.3	11.9	1.0	0.0
1989	23.0	16.6	6.7	15.5	4.4	8.6	3.2	13.3	0.9	0.0
1990	24.7	17.6	6.9	14.8	4.4	9.0	3.1	10.9	0.9	0.0
1991	25.2	17.5	7.1	15.0	4.3	8.9	3.1	10.7	0.8	0.0
1992	24.6	17.5	7.0	14.4	4.2	9.1	3.3	11.7	0.9	0.0
1993	24.0	17.2	6.9	15.1	4.3	9.0	3.2	11.8	0.9	0.0
1994	24.1	17.5	6.9	14.9	4.4	9.0	3.2	11.6	0.9	0.0
1995	24.5	17.4	6.8	14.7	4.4	9.1	3.2	11.6	0.9	0.0
1996	24.1	17.5	6.7	14.9	4.4	9.3	3.3	11.4	0.9	0.0
1997	24.3	17.5	6.7	15.0	4.4	9.2	3.3	11.2	0.8	0.0
1998	24.1	17.3	6.5	15.1	4.5	9.3	3.3	11.4	0.8	0.0
1999	23.9	17.1	6.5	15.3	4.4	9.3	3.3	11.4	0.8	0.0
2000	24.1	17.1	6.4	15.1	4.3	9.4	3.4	11.6	0.7	0.0
2001	24.1	17.0	6.6	15.0	4.2	9.5	3.4	11.4	0.7	0.0
2002	24.0	17.0	6.5	15.0	4.3	9.4	3.5	11.5	0.7	0.0
2003	24.1	17.0	6.4	15.0	4.3	9.3	3.5	11.5	0.7	0.0
2004	24.0	16.9	6.4	15.0	4.4	9.3	3.6	11.5	0.7	0.0

Source: JAMA, 1992-2005; Rowley et al 1991 and 1990; Etzel 1989; Crowley et al 1988 and 1987

Table C.8 Residents per 100,000 Population, per Teaching Hospital, and per Hospital Bed, by Region and State

Region and State	No. of Resident Physicians per 100,000 Population	Residents per bed, across all hospitals	Residents per teaching hospital	Residents per teaching hospital bed
New England, subtotal	**57**	**0.25**	**105.9**	**0.30**
Connecticut	54	0.26	95.9	0.28
Maine	20	0.09	41.1	0.11
Massachusetts	72	0.30	121.4	0.33
New Hampshire	25	0.15	91.8	0.32
Rhode Island	65	0.23	104.5	0.37
Vermont	36	0.28	215.7	0.59
Middle Atlantic, subtotal	**59**	**0.23**	**105.8**	**0.27**
New Jersey	28	0.12	55.4	0.16
New York	76	0.30	141.7	0.34
Pennsylvania	54	0.20	85.9	0.24
East North Central, subtotal	**37**	**0.16**	**72.3**	**0.20**
Illinois	42	0.17	77.9	0.21
Indiana	21	0.08	50.8	0.10
Michigan	40	0.22	92.5	0.26
Ohio	40	0.16	72.6	0.22
Wisconsin	27	0.10	38.0	0.12
West North Central, subtotal	**33**	**0.11**	**49.9**	**0.14**
Iowa	25	0.10	34.5	0.09
Kansas	21	0.07	38.3	0.10
Minnesota	40	0.16	75.6	0.18
Missouri	41	0.12	66.5	0.20
Nebraska	33	0.11	31.5	0.10
North Dakota	16	0.04	13.4	0.06
South Dakota	12	0.03	12.6	0.04
South Atlantic, subtotal	**27**	**0.09**	**81.2**	**0.17**
Delaware	26	0.15	110.9	0.16
District of Columbia	304	0.39	156.5	0.43
Florida	17	0.05	61.3	0.12
Georgia	21	0.08	84.2	0.20
Maryland	40	0.13	96.9	0.20
North Carolina	31	0.11	120.3	0.20
South Carolina	23	0.08	85.7	0.18
Virginia	26	0.10	64.1	0.14
West Virginia	30	0.09	52.1	0.15
East South Central, subtotal	**25**	**0.06**	**56.4**	**0.14**
Alabama	24	0.05	37.2	0.14
Kentucky	23	0.06	42.4	0.12
Mississippi	17	0.03	101.0	0.16
Tennessee	30	0.08	82.5	0.17

Region and State	No. of Resident Physicians per 100,000 Population	Residents per bed, across all hospitals	Residents per teaching hospital	Residents per teaching hospital bed
West South Central, subtotal	**28**	**0.08**	**57.7**	**0.16**
Arkansas	23	0.05	26.4	0.10
Louisiana	38	0.07	55.6	0.21
Oklahoma	19	0.07	41.9	0.13
Texas	28	0.09	68.9	0.16
Mountain, subtotal	**18**	**0.07**	**41.5**	**0.14**
Arizona	20	0.08	50.3	0.15
Colorado	23	0.10	41.2	0.17
Idaho	3	0.02	8.7	0.04
Montana	2	0.01	7.3	0.03
Nevada	9	0.03	45.9	0.09
New Mexico	25	0.09	38.0	0.12
Utah	23	0.11	62.9	0.19
Wyoming	7	0.03	15.3	0.10
Pacific, subtotal	**24**	**0.09**	**52.0**	**0.15**
Alaska	4	0.02	21.3	0.06
California	25	0.10	55.6	0.15
Hawaii	33	0.06	19.9	0.10
Oregon	19	0.09	53.1	0.16
Washington	25	0.08	41.7	0.15
Puerto Rico	18	0.06	34.7	0.18
Total	**34**	**0.12**	**73.0**	**0.19**

Source: JAMA, 2003 (residents per 100,000 population), and NORC analysis of CMS Impact File for FY 2007 Inpatient PPS

Note: Estimated number of residents per hospital is derived from the resident-to-bed ratio and number of beds for each hospital; may not reflect the actual number of residents in some cases.

Table C.9 Number of Programs in Selected Specialties by Region and State, 2003/2004

Region and State	All Programs	Anesthesiology	Family practice	Internal medicine	OB/GYN	Pediatrics	Psychiatry	Radiology-diagnostic	Surgery-general	Transitional year
New England, subtotal	**635**	**13**	**16**	**35**	**16**	**11**	**16**	**21**	**20**	**8**
Connecticut	156	2	3	12	6	2	3	7	6	3
Maine	19	1	4	1	1	1	1	1	1	
Massachusetts	341	8	5	17	6	5	9	10	10	5
New Hampshire	36	1	2	1	1	1	1	1	1	
Rhode Island	54		1	3	1	1	1	1	1	
Vermont	29	1	1	1	1	1	1	1	1	
Middle Atlantic, subtotal	**1760**	**30**	**69**	**108**	**65**	**48**	**43**	**50**	**61**	**25**
New Jersey	171	4	11	19	9	9	5	8	7	2
New York	1059	18	25	60	38	31	30	28	31	9
Pennsylvania	530	8	33	29	18	8	8	14	23	14
East North Central, subtotal	**1335**	**19**	**97**	**66**	**45**	**32**	**24**	**32**	**44**	**34**
Illinois	399	7	28	21	14	11	8	11	10	9
Indiana	95	1	12	3	2	1	1	1	1	3
Michigan	305	3	18	16	13	8	5	9	13	11
Ohio	388	6	24	21	13	9	8	7	16	7
Wisconsin	148	2	15	5	3	3	2	4	4	4
West North Central, subtotal	**537**	**10**	**44**	**20**	**12**	**11**	**13**	**11**	**14**	**8**
Iowa	72	1	10	2	1	2	1	1	2	2
Kansas	48	2	5	2	2	2	2	2	2	
Minnesota	149	2	12	4	2	2	3	2	3	1
Missouri	207	4	7	8	5	4	4	4	4	3
Nebraska	47	1	5	2	2	1	1	2	2	
North Dakota	7		3	1			1		1	1
South Dakota	7		2	1			1			1
South Atlantic, subtotal	**1315**	**20**	**72**	**53**	**43**	**35**	**28**	**25**	**44**	**15**
Delaware	17		2	1	1	1	1	1	1	1
District of Columbia	158	3	1	6	4	3	4	3	5	
Florida	242	4	13	8	7	7	3	6	7	1
Georgia	151	2	12	7	6	5	3	3	7	3
Maryland	207	3	4	13	6	3	4	3	5	5
North Carolina	225	3	14	7	7	5	4	3	6	
South Carolina	76	1	8	3	3	3	2	1	4	1
Virginia	187	3	12	5	6	5	5	4	6	4
West Virginia	52	1	6	3	3	3	2	1	3	

Region and State	All Programs	Anesthesiology	Family practice	Internal medicine	OB/GYN	Pediatrics	Psychiatry	Radiology-diagnostic	Surgery-general	Transitional year
East South Central, subtotal	**386**	**7**	**26**	**16**	**11**	**10**	**9**	**11**	**13**	**5**
Alabama	102	1	8	5	2	2	2	3	4	2
Kentucky	86	2	7	2	2	2	2	2	2	
Mississippi	42	1	2	2	2	2	1	1	2	
Tennessee	156	3	9	7	5	4	4	5	5	3
West South Central, subtotal	**736**	**14**	**53**	**28**	**24**	**18**	**18**	**15**	**20**	**10**
Arkansas	56	1	8	1	1	1	1	1	1	
Louisiana	143	3	9	6	4	3	3	4	4	1
Oklahoma	58	1	8	2	2	2	3	2	2	
Texas	479	9	28	19	17	12	11	8	13	9
Mountain, subtotal	**295**	**4**	**34**	**11**	**8**	**7**	**8**	**5**	**9**	**5**
Arizona	84	1	6	5	3	3	3	2	4	3
Colorado	84	1	11	2	2	1	1	1	2	1
Idaho	4		3							
Montana	3		2							
Nevada	10		2	2	1	1	2		1	
New Mexico	49	1	4	1	1	1	1	1	1	
Utah	59	1	4	1	1	1	1	1	1	1
Wyoming	2		2							
Pacific, subtotal	**903**	**14**	**60**	**42**	**27**	**25**	**21**	**22**	**27**	**17**
Alaska	1		1							
California	696	11	40	32	22	20	17	16	20	10
Hawaii	31		3	2	2	2	2	1	2	2
Oregon	62	1	3	4	1	1	1	1	1	1
Washington	113	2	13	4	2	2	1	4	4	4
Puerto Rico	**66**	**1**	**6**	**9**	**3**	**5**	**2**	**1**	**1**	**4**
Total	7968	132	477	388	254	202	182	193	253	131

Source: Accreditation Council for Graduate Medical Education. "Resident Physician Population by Specialty and State, Academic Year 2003-2004" Web Accreditation Data System. © ACGME 2005-2006

Table C.10 Programs in Selected Specialties as a Percent of National Programs, by Region and State, 2003/2004

Region and State	All Programs	Anesthesiology	Family practice	Internal medicine	OBGYN	Pediatrics	Psychiatry	Radiology-diagnostic	Surgery-general	Transitional year
New England, subtotal	**8%**	**10%**	**3%**	**9%**	**6%**	**5%**	**9%**	**11%**	**8%**	**6%**
Connecticut	2%	2%	1%	3%	2%	1%	2%	4%	2%	2%
Maine	0%	1%	1%	0%	0%	0%	1%	1%	0%	0%
Massachusetts	4%	6%	1%	4%	2%	2%	5%	5%	4%	4%
New Hampshire	0%	1%	0%	0%	0%	0%	1%	1%	0%	0%
Rhode Island	1%	0%	0%	1%	0%	0%	1%	1%	0%	0%
Vermont	0%	1%	0%	0%	0%	0%	1%	1%	0%	0%
Middle Atlantic, subtotal	**22%**	**23%**	**14%**	**28%**	**26%**	**24%**	**24%**	**26%**	**24%**	**19%**
New Jersey	2%	3%	2%	5%	4%	4%	3%	4%	3%	2%
New York	13%	14%	5%	15%	15%	15%	16%	15%	12%	7%
Pennsylvania	7%	6%	7%	7%	7%	4%	4%	7%	9%	11%
East North Central, subtotal	**17%**	**14%**	**20%**	**17%**	**18%**	**16%**	**13%**	**17%**	**17%**	**26%**
Illinois	5%	5%	6%	5%	6%	5%	4%	6%	4%	7%
Indiana	1%	1%	3%	1%	1%	0%	1%	1%	0%	2%
Michigan	4%	2%	4%	4%	5%	4%	3%	5%	5%	8%
Ohio	5%	5%	5%	5%	5%	4%	4%	4%	6%	5%
Wisconsin	2%	2%	3%	1%	1%	1%	1%	2%	2%	3%
West North Central, subtotal	**7%**	**8%**	**9%**	**5%**	**5%**	**5%**	**7%**	**6%**	**6%**	**6%**
Iowa	1%	1%	2%	1%	0%	1%	1%	1%	1%	2%
Kansas	1%	2%	1%	1%	1%	1%	1%	1%	1%	0%
Minnesota	2%	2%	3%	1%	1%	1%	2%	1%	1%	1%
Missouri	3%	3%	1%	2%	2%	2%	2%	2%	2%	2%
Nebraska	1%	1%	1%	1%	1%	0%	1%	1%	1%	0%
North Dakota	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%
South Dakota	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%
South Atlantic, subtotal	**17%**	**15%**	**15%**	**14%**	**17%**	**17%**	**15%**	**13%**	**17%**	**11%**
Delaware	0%	0%	0%	0%	0%	0%	1%	1%	0%	1%
District of Columbia	2%	2%	0%	2%	2%	1%	2%	2%	2%	0%
Florida	3%	3%	3%	2%	3%	3%	2%	3%	3%	1%
Georgia	2%	2%	3%	2%	2%	2%	2%	2%	3%	2%
Maryland	3%	2%	1%	3%	2%	1%	2%	2%	2%	4%
North Carolina	3%	2%	3%	2%	3%	2%	2%	2%	2%	0%
South Carolina	1%	1%	2%	1%	1%	1%	1%	1%	2%	1%
Virginia	2%	2%	3%	1%	2%	2%	3%	2%	2%	3%
West Virginia	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%

Region and State	All Programs	Anesthes-iology	Family practice	Internal medicine	OBGYN	Pediatrics	Psychiatry	Radiology-diagnostic	Surgery-general	Transitional year
East South Central, subtotal	**5%**	**5%**	**5%**	**4%**	**4%**	**5%**	**5%**	**6%**	**5%**	**4%**
Alabama	1%	1%	2%	1%	1%	1%	1%	2%	2%	2%
Kentucky	1%	2%	1%	1%	1%	1%	1%	1%	1%	0%
Mississippi	1%	1%	0%	1%	1%	1%	1%	1%	1%	0%
Tennessee	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%
West South Central, subtotal	**9%**	**11%**	**11%**	**7%**	**9%**	**9%**	**10%**	**8%**	**8%**	**8%**
Arkansas	1%	1%	2%	0%	0%	0%	1%	1%	0%	0%
Louisiana	2%	2%	2%	2%	2%	1%	2%	2%	2%	1%
Oklahoma	1%	1%	2%	1%	1%	1%	2%	1%	1%	0%
Texas	6%	7%	6%	5%	7%	6%	6%	4%	5%	7%
Mountain, subtotal	**4%**	**3%**	**7%**	**3%**	**3%**	**3%**	**4%**	**3%**	**4%**	**4%**
Arizona	1%	1%	1%	1%	1%	1%	2%	1%	2%	2%
Colorado	1%	1%	2%	1%	1%	0%	1%	1%	1%	1%
Idaho	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Montana	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nevada	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%
New Mexico	1%	1%	1%	0%	0%	0%	1%	1%	0%	0%
Utah	1%	1%	1%	0%	0%	0%	1%	1%	0%	1%
Wyoming	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pacific, subtotal	**11%**	**11%**	**13%**	**11%**	**11%**	**12%**	**12%**	**11%**	**11%**	**13%**
Alaska	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
California	9%	8%	8%	8%	9%	10%	9%	8%	8%	8%
Hawaii	0%	0%	1%	1%	1%	1%	1%	1%	1%	2%
Oregon	1%	1%	1%	1%	0%	0%	1%	1%	0%	1%
Washington	1%	2%	3%	1%	1%	1%	1%	2%	2%	3%
Puerto Rico	**1%**	**1%**	**1%**	**2%**	**1%**	**2%**	**1%**	**1%**	**0%**	**3%**
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Accreditation Council for Graduate Medical Education. "Resident Physician Population by Specialty and State, Academic Year 2003-2004" Web Accreditation Data System. © ACGME 2005-2006

Table C.11 Number of Residents in Selected Specialties, by Region and State, 2003/2004

Region and State	All Programs	Anesthes-iology	Family practice	Internal medicine	OB/GYN	Pediatrics	Psychiatry	Radiology-diagnostic	Surgery-general	Transitional year
New England, subtotal	**8086**	**449**	**350**	**2111**	**304**	**437**	**438**	**379**	**581**	**64**
Connecticut	1877	78	57	597	105	97	93	102	154	21
Maine	260	13	88	44	12	18	13	14	16	
Massachusetts	4704	320	123	1175	132	234	252	212	320	43
New Hampshire	315	22	24	56	15	22	27	16	29	
Rhode Island	683		40	197	28	48	39	21	40	
Vermont	247	16	18	42	12	18	14	14	22	
Middle Atlantic, subtotal	**24169**	**1012**	**1393**	**6723**	**1089**	**1963**	**1179**	**925**	**1797**	**248**
New Jersey	2425	84	211	814	125	258	109	89	188	22
New York	14941	647	570	4302	651	1353	833	531	1066	77
Pennsylvania	6803	281	612	1607	313	352	237	305	543	149
East North Central, subtotal	**16800**	**857**	**1846**	**3602**	**800**	**1250**	**588**	**689**	**1181**	**329**
Illinois	5435	298	570	1396	235	405	197	182	338	75
Indiana	1197	77	257	164	53	74	29	67	61	37
Michigan	4086	138	397	804	222	252	122	214	325	126
Ohio	4631	234	400	1000	235	412	182	152	376	50
Wisconsin	1451	110	222	238	55	107	58	74	81	41
West North Central, subtotal	**6356**	**308**	**926**	**1103**	**236**	**413**	**281**	**307**	**436**	**65**
Iowa	743	47	161	95	16	54	22	29	50	8
Kansas	612	40	107	104	32	33	47	30	52	
Minnesota	1958	72	282	335	50	107	71	85	143	9
Missouri	2311	116	165	427	117	185	92	133	132	34
Nebraska	540	33	125	97	21	34	22	30	47	
North Dakota	103		48	21			14		12	8
South Dakota	89		38	24			13			6
South Atlantic, subtotal	**15317**	**812**	**1573**	**2772**	**777**	**1259**	**770**	**601**	**1155**	**158**
Delaware	260		41	36	15	57	12	16	24	9
District of Columbia	1728	43	18	382	92	163	90	43	155	
Florida	2852	240	363	409	139	304	94	146	188	8
Georgia	1888	77	238	368	100	125	80	75	159	28
Maryland	2568	156	101	611	107	138	154	89	161	47
North Carolina	2551	136	278	415	139	177	134	107	170	
South Carolina	968	31	196	134	52	90	67	27	88	6
Virginia	1990	105	239	320	101	169	115	85	150	60
West Virginia	512	24	99	97	32	36	24	13	60	

Region and State	All Programs	Anesthes-iology	Family practice	Internal medicine	OB/GYN	Pediatrics	Psychiatry	Radiology-diagnostic	Surgery-general	Transitional year
East South Central, subtotal	**4344**	**245**	**493**	**794**	**215**	**328**	**169**	**218**	**423**	**46**
Alabama	1087	51	153	225	43	73	30	60	100	20
Kentucky	966	80	113	130	43	71	49	36	82	
Mississippi	489	29	49	88	33	47	15	22	54	
Tennessee	1802	85	178	351	96	137	75	100	187	26
West South Central, subtotal	**9169**	**543**	**1122**	**1383**	**514**	**732**	**413**	**401**	**658**	**105**
Arkansas	618	57	137	64	17	58	22	24	32	
Louisiana	1658	67	153	266	103	105	67	75	152	17
Oklahoma	632	23	135	103	32	49	51	41	42	
Texas	6261	396	697	950	362	520	273	261	432	88
Mountain, subtotal	**3455**	**124**	**601**	**663**	**178**	**280**	**161**	**109**	**278**	**47**
Arizona	1076	29	132	229	73	103	53	38	109	25
Colorado	1058	35	195	178	52	68	41	30	92	12
Idaho	43		42							
Montana	17		16							
Nevada	187		31	78	13	35	13		17	
New Mexico	472	27	70	77	23	32	36	23	27	
Utah	568	33	81	101	17	42	18	18	33	10
Wyoming	34		34							
Pacific, subtotal	**11701**	**506**	**1388**	**2326**	**517**	**979**	**605**	**488**	**901**	**177**
Alaska	23		23							
California	9117	399	1005	1808	412	810	468	369	672	116
Hawaii	394		34	81	41	38	40	19	40	21
Oregon	682	21	70	188	24	39	33	21	69	8
Washington	1485	86	256	249	40	92	64	79	120	32
Puerto Rico	779	22	93	208	35	101	25	17	31	35
Total	**100176**	**4878**	**9785**	**21685**	**4665**	**7742**	**4629**	**4134**	**7441**	**1274**

Source: Accreditation Council for Graduate Medical Education. "Resident Physician Population by Specialty and State, Academic Year 2003-2004" Web Accreditation Data System. © ACGME 2005-2006

Table C.12 Residents in Selected Specialties as a Percent of National Residents, by Region and State, 2003/2004

Region and State	All Programs	Anesthes-iology	Family practice	Internal medicine	OB/GYN	Pediatrics	Psychiatry	Radiology-diagnostic	Surgery-general	Transitional year
New England, subtotal	8%	**9%**	**4%**	**10%**	**7%**	**6%**	**9%**	**9%**	**8%**	**5%**
Connecticut	2%	2%	1%	3%	2%	1%	2%	2%	2%	2%
Maine	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Massachusetts	5%	7%	1%	5%	3%	3%	5%	5%	4%	3%
New Hampshire	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
Rhode Island	1%	0%	0%	1%	1%	1%	1%	1%	1%	0%
Vermont	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Middle Atlantic, subtotal	24%	**21%**	**14%**	**31%**	**23%**	**25%**	**25%**	**22%**	**24%**	**19%**
New Jersey	2%	2%	2%	4%	3%	3%	2%	2%	3%	2%
New York	15%	13%	6%	20%	14%	17%	18%	13%	14%	6%
Pennsylvania	7%	6%	6%	7%	7%	5%	5%	7%	7%	12%
East North Central, subtotal	17%	**18%**	**19%**	**17%**	**17%**	**16%**	**13%**	**17%**	**16%**	**26%**
Illinois	5%	6%	6%	6%	5%	5%	4%	4%	5%	6%
Indiana	1%	2%	3%	1%	1%	1%	1%	2%	1%	3%
Michigan	4%	3%	4%	4%	5%	3%	3%	5%	4%	10%
Ohio	5%	5%	4%	5%	5%	5%	4%	4%	5%	4%
Wisconsin	1%	2%	2%	1%	1%	1%	1%	2%	1%	3%
West North Central, subtotal	6%	**6%**	**9%**	**5%**	**5%**	**5%**	**6%**	**7%**	**6%**	**5%**
Iowa	1%	1%	2%	0%	0%	1%	0%	1%	1%	1%
Kansas	1%	1%	1%	0%	1%	0%	1%	1%	1%	0%
Minnesota	2%	1%	3%	2%	1%	1%	2%	2%	2%	1%
Missouri	2%	2%	2%	2%	3%	2%	2%	3%	2%	3%
Nebraska	1%	1%	1%	0%	0%	0%	0%	1%	1%	0%
North Dakota	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
South Dakota	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
South Atlantic, subtotal	15%	**17%**	**16%**	**13%**	**17%**	**16%**	**17%**	**15%**	**16%**	**12%**
Delaware	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%
District of Columbia	2%	1%	0%	2%	2%	2%	2%	1%	2%	0%
Florida	3%	5%	4%	2%	3%	4%	2%	4%	3%	1%
Georgia	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Maryland	3%	3%	1%	3%	2%	2%	3%	2%	2%	4%
North Carolina	3%	3%	3%	2%	3%	2%	3%	3%	2%	0%
South Carolina	1%	1%	2%	1%	1%	1%	1%	1%	1%	0%
Virginia	2%	2%	2%	1%	2%	2%	2%	2%	2%	5%
West Virginia	1%	0%	1%	0%	1%	0%	1%	0%	1%	0%

Region and State	All Programs	Anesthes-iology	Family practice	Internal medicine	OB/GYN	Pediatrics	Psychiatry	Radiology-diagnostic	Surgery-general	Transitional year
East South Central, subtotal	4%	**5%**	**5%**	**4%**	**5%**	**4%**	**4%**	**5%**	**6%**	**4%**
Alabama	1%	1%	2%	1%	1%	1%	1%	1%	1%	2%
Kentucky	1%	2%	1%	1%	1%	1%	1%	1%	1%	0%
Mississippi	0%	1%	1%	0%	1%	1%	0%	1%	1%	0%
Tennessee	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%
West South Central, subtotal	9%	**11%**	**11%**	**6%**	**11%**	**9%**	**9%**	**10%**	**9%**	**8%**
Arkansas	1%	1%	1%	0%	0%	1%	0%	1%	0%	0%
Louisiana	2%	1%	2%	1%	2%	1%	1%	2%	2%	1%
Oklahoma	1%	0%	1%	0%	1%	1%	1%	1%	1%	0%
Texas	6%	8%	7%	4%	8%	7%	6%	6%	6%	7%
Mountain, subtotal	3%	**3%**	**6%**	**3%**	**4%**	**4%**	**3%**	**3%**	**4%**	**4%**
Arizona	1%	1%	1%	1%	2%	1%	1%	1%	1%	2%
Colorado	1%	1%	2%	1%	1%	1%	1%	1%	1%	1%
Idaho	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Montana	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nevada	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
New Mexico	0%	1%	1%	0%	0%	0%	1%	1%	0%	0%
Utah	1%	1%	1%	0%	0%	1%	0%	0%	0%	1%
Wyoming	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pacific, subtotal	12%	**10%**	**14%**	**11%**	**11%**	**13%**	**13%**	**12%**	**12%**	**14%**
Alaska	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
California	9%	8%	10%	8%	9%	10%	10%	9%	9%	9%
Hawaii	0%	0%	0%	0%	1%	0%	1%	0%	1%	2%
Oregon	1%	0%	1%	1%	1%	1%	1%	1%	1%	1%
Washington	1%	2%	3%	1%	1%	1%	1%	2%	2%	3%
Puerto Rico	1%	0%	1%	1%	1%	1%	1%	0%	0%	3%
Total	100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Accreditation Council for Graduate Medical Education. "Resident Physician Population by Specialty and State, Academic Year 2003-2004" Web Accreditation Data System. © ACGME 2005-2006

Table C.13 Urban/Rural Status of Teaching Hospitals and Residents, by State and Region

	% of State's Teaching Hospitals			% of State's Residents		
Region and State	Large Urban	Other Urban	Rural	Large Urban	Other Urban	Rural
New England, subtotal	50%	47%	3%	59%	37%	4%
Connecticut	29%	71%	0%	36%	64%	0%
Maine	0%	83%	17%	0%	92%	8%
Massachusetts	69%	31%	0%	75%	25%	0%
New Hampshire	0%	67%	33%	0%	10%	90%
Rhode Island	100%	0%	0%	100%	0%	0%
Vermont	0%	100%	0%	0%	100%	0%
Middle Atlantic, subtotal	74%	23%	3%	89%	10%	1%
New Jersey	88%	12%	0%	94%	6%	0%
New York	82%	15%	3%	94%	6%	0%
Pennsylvania	54%	41%	6%	75%	21%	4%
East North Central, subtotal	55%	37%	8%	73%	27%	1%
Illinois	75%	20%	5%	92%	8%	0%
Indiana	33%	67%	0%	81%	19%	0%
Michigan	57%	33%	10%	58%	41%	1%
Ohio	48%	43%	9%	70%	29%	1%
Wisconsin	38%	46%	15%	47%	50%	3%
West North Central, subtotal	38%	46%	17%	55%	43%	2%
Iowa	0%	88%	12%	0%	97%	3%
Kansas	27%	45%	27%	46%	52%	2%
Minnesota	67%	28%	6%	60%	40%	0%
Missouri	72%	17%	10%	84%	14%	2%
Nebraska	0%	58%	42%	0%	97%	3%
North Dakota	0%	80%	20%	0%	93%	7%
South Dakota	0%	75%	25%	0%	100%	0%
South Atlantic, subtotal	62%	33%	5%	55%	44%	1%
Delaware	0%	100%	0%	0%	100%	0%
District of Columbia	100%	0%	0%	100%	0%	0%
Florida	90%	10%	0%	79%	21%	0%
Georgia	59%	35%	6%	59%	40%	0%
Maryland	100%	0%	0%	100%	0%	0%
North Carolina	19%	81%	0%	11%	89%	0%
South Carolina	0%	78%	22%	0%	98%	2%
Virginia	73%	18%	9%	56%	43%	1%
West Virginia	0%	80%	20%	0%	96%	4%
East South Central, subtotal	44%	40%	16%	56%	41%	3%
Alabama	47%	47%	6%	59%	39%	2%
Kentucky	33%	28%	39%	55%	39%	7%
Mississippi	0%	67%	33%	0%	94%	6%
Tennessee	59%	41%	0%	68%	32%	0%
West South Central, subtotal	50%	46%	5%	71%	28%	0%
Arkansas	8%	75%	17%	3%	94%	3%
Louisiana	47%	53%	0%	59%	41%	0%
Oklahoma	50%	31%	19%	63%	36%	1%
Texas	58%	42%	0%	81%	19%	0%

Region and State	% of State's Teaching Hospitals			% of State's Residents		
	Large Urban	Other Urban	Rural	Large Urban	Other Urban	Rural
Mountain, subtotal	45%	50%	5%	51%	48%	1%
Arizona	81%	13%	6%	62%	36%	1%
Colorado	65%	29%	6%	89%	11%	0%
Idaho	0%	100%	0%	0%	100%	0%
Montana	0%	100%	0%	0%	100%	0%
Nevada	67%	33%	0%	79%	21%	0%
New Mexico	0%	88%	13%	0%	99%	1%
Utah	0%	100%	0%	0%	100%	0%
Wyoming	0%	100%	0%	0%	100%	0%
Pacific, subtotal	80%	19%	1%	91%	9%	0%
Alaska	0%	100%	0%	0%	100%	0%
California	88%	12%	0%	93%	7%	0%
Hawaii	0%	100%	0%	0%	100%	0%
Oregon	89%	0%	11%	96%	0%	4%
Washington	56%	44%	0%	85%	15%	0%
Puerto Rico	54%	46%	0%	77%	23%	0%
Total	59%	35%	6%	73%	26%	1%

Source: NORC analysis of FY2007 IPPS Impact File, based on March 2006 MEDPAR and Provider Specific File, and FY2003/2004 Cost Report Data

Table C.14 Share of Hospitals That Are Teaching Hospitals, by Region, State, and Urban/Rural Status

Region and State	All Hospitals	Teaching Hospitals	Teaching Hospitals as % of All Hospitals	Teaching Hosptials as % of All Hospitals, by Urban/Rural Status		
				Large Urban	Other Urban	Rural
New England, subtotal	147	64	44%	54%	43%	11%
Connecticut	32	17	53%	38%	71%	0%
Maine	21	6	29%	n/a	45%	10%
Massachusetts	64	32	50%	63%	34%	n/a
New Hampshire	13	3	23%	n/a	20%	33%
Rhode Island	11	5	45%	45%	n/a	n/a
Vermont	6	1	17%	n/a	50%	0%
Middle Atlantic, subtotal	429	214	50%	61%	50%	10%
New Jersey	79	43	54%	58%	36%	n/a
New York	186	100	54%	70%	39%	10%
Pennsylvania	164	71	43%	49%	63%	10%
East North Central, subtotal	520	212	41%	53%	45%	14%
Illinois	136	60	44%	54%	44%	12%
Indiana	79	21	27%	29%	38%	0%
Michigan	103	49	48%	74%	46%	17%
Ohio	133	56	42%	47%	55%	16%
Wisconsin	69	26	38%	53%	40%	20%
West North Central, subtotal	282	96	34%	47%	54%	13%
Iowa	34	17	50%	n/a	75%	14%
Kansas	53	11	21%	21%	38%	12%
Minnesota	54	18	33%	50%	56%	5%
Missouri	80	29	36%	54%	38%	11%
Nebraska	22	12	55%	n/a	58%	50%
North Dakota	14	5	36%	n/a	80%	11%
South Dakota	25	4	16%	n/a	33%	6%
South Atlantic, subtotal	611	135	22%	37%	22%	4%
Delaware	5	2	40%	n/a	67%	0%
District of Columbia	7	6	86%	86%	n/a	n/a
Florida	175	39	22%	36%	7%	0%
Georgia	111	17	15%	27%	19%	2%
Maryland	46	14	30%	40%	0%	0%
North Carolina	97	16	16%	25%	33%	0%
South Carolina	54	9	17%	0%	23%	9%
Virginia	80	22	28%	42%	25%	8%
West Virginia	36	10	28%	n/a	47%	11%
East South Central, subtotal	346	55	16%	39%	21%	5%
Alabama	98	17	17%	47%	22%	2%
Kentucky	69	18	26%	55%	29%	17%
Mississippi	71	3	4%	0%	11%	2%
Tennessee	108	17	16%	32%	23%	0%
West South Central, subtotal	573	107	19%	28%	26%	3%
Arkansas	52	12	23%	100%	33%	8%
Louisiana	111	19	17%	35%	20%	0%
Oklahoma	93	16	17%	32%	23%	7%
Texas	317	60	19%	25%	28%	0%

Region and State	All Hospitals	Teaching Hospitals	Teaching Hospitals as % of All Hospitals	Teaching Hosptials as % of All Hospitals, by Urban/Rural Status		
				Large Urban	Other Urban	Rural
Mountain, subtotal	245	58	24%	42%	31%	3%
Arizona	63	16	25%	39%	13%	7%
Colorado	46	17	37%	65%	36%	7%
Idaho	16	4	25%	n/a	33%	0%
Montana	16	2	13%	n/a	33%	0%
Nevada	23	3	13%	17%	17%	0%
New Mexico	36	8	22%	n/a	44%	5%
Utah	33	6	18%	n/a	27%	0%
Wyoming	12	2	17%	n/a	100%	0%
Pacific, subtotal	471	144	31%	40%	20%	2%
Alaska	12	1	8%	n/a	20%	0%
California	361	110	30%	39%	14%	0%
Hawaii	15	6	40%	n/a	60%	0%
Oregon	34	9	26%	53%	0%	13%
Washington	49	18	37%	50%	35%	0%
Puerto Rico	53	13	25%	21%	30%	n/a
Total	**3677**	**1098**	**30%**	**44%**	**33%**	**6%**

Source: FY2007 IPPS Impact File, based on March 2006 MEDPAR and Provider Specific File, and FY2003/2004 Cost Report Data

Note: Estimated number of residents per hospital is derived from the resident-to-bed ratio and number of beds for each hospital; may not reflect the actual number of residents in some cases.

Table C.15 Gender, Race, and International Status of Residents, 1979-2004

Year	Residents on Duty	Female	Race				International Medical Graduates
			White	Black	Asian	Other/ Unknown	
1977	56,019	15%					25%
1978	63,163	19%					20%
1979	64,615	19%	79%	5%	12%	0%	20%
1980	61,456	22%	80%	5%	11%	0%	20%
1981	69,738	23%	80%	5%	10%	0%	19%
1982	70,523	23%	82%	5%	8%	0%	19%
1983	72,397	24%	82%	5%	8%	0%	18%
1984	75,125	25%	82%	5%	8%	0%	18%
1985	74,514	26%	83%	4%	8%	0%	17%
1986	76,815	27%	83%	5%	8%	0%	16%
1987	81,410	28%	81%	5%	8%	0%	16%
1988	81,093	27%	80%	4%	10%	0%	15%
1989	71,909	29%	78%	4%	12%	0%	17%
1990	82,902	30%	75%	5%	14%	1%	18%
1991	86,217	30%	71%	5%	17%	1%	20%
1992	89,368	30%	68%	5%	20%	1%	20%
1993	97,370	32%	66%	5%	22%	2%	23%
1994	97,832	33%	62%	5%	23%	5%	24%
1995	98,035	34%	59%	5%	24%	7%	26%
1996	98,076	35%	59%	5%	19%	13%	25%
1997	98,143	36%	57%	5%	18%	14%	26%
1998	97,383	37%	57%	5%	18%	14%	26%
1999	97,989	38%	56%	6%	19%	15%	26%
2000	96,806	38%	61%	6%	22%	6%	27%
2001	96,410	40%	60%	6%	25%	9%	26%
2002	98,258	40%	57%	6%	24%	13%	26%
2003	99,964	41%	54%	5%	26%	15%	27%
2004	101,291	42%	55%	5%	25%	15%	26%

Source: JAMA, 1992-2005; Rowley et al 1991 and 1990; Etzel 1989; Crowley et al 1988 and 1987

Table C.16 Gender, Race, and Hispanic Origin of Medical Residents, by Specialty, 2002/2003

			Race				
	Female	Hispanic Origin	White	Asian	Black	American Indian/ Alaskan Native/ Native Hawaiian/ Pacific Islander	Other/ Unknown
Allergy and immunology and subspecialties	49%	5%	56%	25%	2%	0%	16%
Anesthesiology and subspecialties	27%	6%	61%	24%	4%	1%	10%
Colon and rectal surgery	18%	7%	68%	12%	7%	2%	12%
Dermatology and subspecialties	55%	5%	69%	16%	3%	1%	12%
Emergency medicine and subspecialties	30%	6%	73%	13%	5%	1%	8%
Family medicine and subspecialties	50%	7%	59%	19%	7%	1%	15%
Medical genetics and subspecialties	57%	9%	72%	16%	0%	0%	12%
Internal medicine	40%	5%	47%	32%	5%	0%	15%
Cardiovascular disease	25%	7%	57%	26%	4%	0%	13%
Endocrinology, diabetes, and metabolism	41%	5%	52%	33%	3%	0%	12%
Gastroenterology	17%	6%	51%	29%	4%	0%	16%
Geriatric medicine	53%	7%	49%	30%	3%	1%	17%
Hematology or Hematology and oncology	21%	7%	47%	31%	4%	0%	18%
Infectious disease	53%	5%	45%	38%	8%	0%	9%
Interventional cardiology	42%	7%	52%	32%	5%	0%	12%
Nephrology	17%	8%	50%	31%	3%	0%	15%
Oncology	7%	4%	40%	33%	2%	1%	24%
Pulmonary disease or Pulm. and critical care med	32%	4%	47%	39%	4%	0%	10%
Rheumatology	36%	5%	48%	39%	5%	1%	7%
Internal Medicine - other subspecialties	52%	7%	55%	29%	3%	0%	13%
Neurological surgery	10%	6%	62%	19%	6%	0%	13%
Neurology and subspecialties	38%	7%	56%	26%	2%	0%	15%
Nuclear medicine	23%	4%	52%	34%	2%	2%	10%
Obstetrics and gynecology	74%	8%	61%	15%	13%	1%	10%
Ophthalmology	34%	4%	60%	25%	2%	1%	11%
Orthopaedic surgery and subspecialties	9%	3%	75%	12%	4%	1%	9%
Otolaryngology and subspecialties	20%	4%	67%	21%	3%	0%	9%
Pathology-anatomic and clinical and subs	49%	5%	54%	31%	4%	1%	11%
Pediatrics	67%	7%	59%	21%	7%	1%	13%
Neonatal-perinatal medicine							
Pediatric cardiology	51%	5%	61%	22%	6%	0%	11%
Pediatric critical care medicine	41%	8%	63%	24%	2%	0%	11%
Pediatric emergency medicine	40%	9%	56%	22%	4%	0%	16%
Pediatric endocrinology	51%	5%	66%	10%	2%	0%	22%
Pediatric hematology/oncology	37%	15%	40%	32%	7%	0%	22%
Pediatrics - other subspecialties	54%	7%	59%	20%	6%	0%	15%
Physical medicine and rehabilitation and subs	37%	8%	47%	31%	7%	1%	14%
Plastic surgery and subspecialties	26%	6%	65%	20%	3%	0%	12%
Preventive medicine and subspecialties	37%	3%	47%	15%	8%	1%	29%
Psychiatry and subspecialties	51%	7%	55%	25%	7%	1%	12%
Radiology-diagnostic and subspecialties	25%	5%	63%	25%	3%	0%	9%
Radiation oncology	30%	5%	54%	31%	4%	1%	10%
Surgery-general and subspecialties	25%	6%	60%	19%	6%	1%	14%
Thoracic surgery	8%	6%	61%	18%	5%	1%	15%
Urology and subspecialties	14%	4%	66%	20%	3%	0%	11%
Sleep medicine							
Combo - Neurology with other specialties	36%	6%	61%	18%	11%	1%	10%
Combo - Pediatrics with other specialties	49%	4%	63%	19%	7%	1%	10%
Combo - Psychiatry with other specialties	0%	0%	70%	30%	0%	0%	0%
Combo - Internal Medicine with other specialties	58%	7%	71%	12%	9%	0%	8%
Combo - Internal Medicine/Pediatrics	35%	7%	64%	12%	12%	2%	10%
Transitional year	30%	5%	56%	21%	3%	0%	19%
TOTAL	**40%**	**6%**	**57%**	**24%**	**6%**	**1%**	**13%**

Source: JAMA, 2003

Table C.17 Resident Physicians by Specialty, by Location of Medical School, 2002/2003

	US: MD and DO		Canadians		IMG		
	#	%	#	%	#	%	Total
Allergy and immunology and subspecialties	212	80.6%	1	0.4%	50	19.0%	263
Anesthesiology and subspecialties	3,225	66.0%	12	0.2%	1,647	33.7%	4,887
Colon and rectal surgery	52	86.7%	1	1.7%	7	11.7%	60
Dermatology and subspecialties	934	95.3%	3	0.3%	41	4.2%	980
Emergency medicine and subspecialties	3,713	95.5%	18	0.5%	156	4.0%	3,889
Family medicine and subspecialties	7,058	72.8%	27	0.3%	2,606	26.9%	9,700
Medical genetics and subspecialties	43	63.2%	0	0.0%	25	36.8%	68
Internal medicine	12,953	61.3%	75	0.4%	8,084	38.2%	21,136
Cardiovascular disease	637	57.4%	5	0.5%	465	41.9%	1,109
Endocrinology, diabetes, and metabolism	577	58.7%	7	0.7%	399	40.6%	983
Gastroenterology	1,332	66.6%	9	0.5%	658	32.9%	1,999
Geriatric medicine	259	59.3%	3	0.7%	175	40.0%	437
Hematology or Hematology and oncology	738	69.8%	7	0.7%	313	29.6%	1,058
Infectious disease	154	47.1%	2	0.6%	171	52.3%	327
Interventional cardiology	365	58.4%	9	1.4%	250	40.0%	625
Nephrology	111	45.1%	8	3.3%	125	50.8%	246
Oncology	65	53.7%	5	4.1%	51	42.1%	121
Pulmonary disease or Pulm. and critical care medicine	434	61.0%	6	0.8%	271	38.1%	711
Rheumatology	122	61.3%	0	0.0%	77	38.7%	199
Internal Medicine - other subspecialties	195	63.5%	2	0.7%	110	35.8%	307
Neurological surgery	701	90.1%	7	0.9%	70	9.0%	778
Neurology and subspecialties	905	58.5%	8	0.5%	635	41.0%	1,548
Nuclear medicine	54	47.0%	0	0.0%	61	53.0%	115
Obstetrics and gynecology	3,989	85.7%	12	0.3%	654	14.0%	4,656
Ophthalmology	1,192	92.4%	2	0.2%	94	7.3%	1,290
Orthopaedic surgery and subspecialties	3,142	97.7%	7	0.2%	66	2.1%	3,217
Otolaryngology and subspecialties	1,086	97.7%	3	0.3%	22	2.0%	1,111
Pathology-anatomic and clinical and subspecialties	1,274	49.1%	13	0.5%	1,308	50.4%	2,596
Pediatrics	6,053	78.6%	23	0.3%	1,621	21.1%	7,699
Pediatric cardiology	262	59.4%	2	0.5%	176	39.9%	441
Pediatric critical care medicine	160	67.5%	5	2.1%	72	30.4%	237
Pediatric emergency medicine	168	67.2%	4	1.6%	78	31.2%	250
Pediatric endocrinology	162	92.6%	1	0.6%	12	6.9%	175
Pediatric hematology/oncology	46	50.5%	1	1.1%	44	48.4%	91
Pediatrics - other subspecialties	525	65.0%	15	1.9%	267	33.0%	808
Physical medicine and rehabilitation and subspecialties	728	65.6%	1	0.1%	378	34.1%	1,110
Plastic surgery and subspecialties	506	92.7%	5	0.9%	33	6.0%	546
Preventive medicine and subspecialties	284	84.5%	3	0.9%	48	14.3%	336
Psychiatry and subspecialties	3,109	59.8%	29	0.6%	2,050	39.4%	5,202
Radiology-diagnostic and subspecialties	3,726	87.8%	25	0.6%	486	11.5%	4,243
Radiation oncology	442	87.9%	0	0.0%	60	11.9%	503
Surgery-general and subspecialties	6,267	81.4%	37	0.5%	1,391	18.1%	7,695
Thoracic surgery	232	74.8%	5	1.6%	73	23.5%	310
Urology and subspecialties	970	95.2%	4	0.4%	45	4.4%	1,019
Combo - Neurology with other specialties	196	74.0%	0	0.0%	69	26.0%	265
Combo - Pediatrics with other specialties	1,347	89.4%	1	0.1%	157	10.4%	1,507
Combo - Psychiatry with other specialties	10	100.0%	0	0.0%	0	0.0%	10
Combo - Internal Medicine with other specialties	117	92.9%	0	0.0%	9	7.1%	126
Combo - Internal Medicine/Pediatrics	74	86.0%	2	2.3%	10	11.6%	86
Transitional year	1,067	90.2%	3	0.3%	113	9.6%	1,183
TOTAL	**71,973**	**73.2%**	**418**	**0.4%**	**25,783**	**26.2%**	**98,258**

Source: JAMA, 2003.