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EVALUATION OF THE NEW YORK STATE & 1997 BALANCED BUDGET ACT (BBA) GRADUATE MEDICAL EDUCATION (GME) DEMONSTRATION AND PAYMENT REFORMS

Final Report

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INTRODUCTION

1.1 Purpose & Scope of Report

This document is a Final Report evaluating both the Voluntary Resident Reduction Demonstration in New York State as well as the 1997 Balanced Budget Act (BBA) provisions regarding Graduate Medical Education (GME) payment reforms. Several extensive analytic background and impact reports have been submitted to the Centers for Medicare & Medicaid Services over the project's duration. Summaries of these reports are included as sections in this final report.

CMS' scope of work for the New York GME evaluation was quite broad. Key policy questions included:

- Did the hospital participants meet their resident reduction targets?
- Which participants withdrew from the demonstration and why?
- What was the impact of reductions on the process, quality, and access to care?
- What impact did reductions have on hospital volumes and finances?

1.2 Summary of the New York GME Demonstration

CMS, just prior to the passage of the BBA in the fall of 1997, began a demonstration with New York teaching hospitals to voluntarily reduce their residency counts. In return, participants would receive transition payments to partially offset reductions in Indirect and Direct Medical Education (IME and DME) payments. Teaching hospitals at that time were concerned about proposed reductions in Medicare financial support. New York hospitals, with some of the highest resident-to-bed ratios in the country, would likely be most affected by major reductions in payments. In June, 1996, the Greater New York Hospital Association (GNYHA) applied to CMS to undertake resident reduction with offsetting transition payments. After negotiating payment schedules, resident reduction targets, and related issues, the demonstration became operational on July 1, 1997, with 42 Phase I participating hospitals. Seven Rochester hospitals were added soon after, but all seven withdrew from the demonstration within the first year.

Interviews with both Congressional and CMS staff indicated certain demonstration objectives as well as concerns. The over-arching goal of the demonstration was to test how popular and successful a transition payment arrangement would be in reducing the number of specialist residents while maintaining or increasing primary care residents. In 1997, it was widely believed that the country was training too many specialists, and that the spread of managed care would be increasing the need for more primary care physicians. Primary issues that focused our evaluation included:

- Resident replacement strategies
- Consortia disaffiliations
- IMG reductions
- Resident training in ambulatory care sites
- Impact of managed care and New York Code 405 restrictions on resident work hours
- Quality and access to hospital services.

Terms and conditions of hospital participation the demonstration included:

- A 20-25 percent reduction in overall FTE residents
- No reduction in the proportion of residents in primary care
- A glidepath of annual reductions that assured success at the end of the demonstration
- Transition payments by CMS that reimbursed 100 percent of the lost IME and DME payments in year 1 from fewer residents with declining "hold harmless" proportions through the last (year 6) of the demonstration
- Withdrawal from the demonstration at the end of each year by returning any transition payments received from CMS
- Failure to meet the final 20-25 percent reduction in residents required returning all transition payments to CMS

Two or three technical issues further impacted participants:

- All dental residents were included in the resident counts, even though HRSA was promoting dental training to fill a perceived shortage of dentists
- In-rotations of residents to the hospital would be included in the participant's FTE resident count
- 1996 resident counts formed the baseline for targeted 20-25 percent reductions regardless of whether they were unusually high, thereby necessitating greater absolute reductions

Over the course of the demonstration all but seven of the 49 hospital participants eventually withdrew. All of the continuing participants are in New York City and five of seven are part of the New York Health and Hospitals Corporation (HHC).

1.3 Summary of the BBA GME Program and Payment Provisions

The provisions in the BBA related to GME included seven sections. Section 4626 involved a voluntary resident reduction program modeled after the one in New York. RTI was contracted to evaluate this national program, but because only two teaching hospitals outside New York applied, CMS decided not to evaluate their performance. Initial concerns by Congress that the New York demonstration was a “give-away,” proved unfounded as the terms and conditions were quite strenuous. Section 4628 further established a demonstration of teaching hospital consortia, but, again, no groups applied. Sections 4621-23 contained key mandatory payment revisions:

- FTE allopathic and osteopathic residents were capped at a level no higher than the hospital’s FY 1996 total

- The hospital’s resident-to-bed ratio was also capped at a level no higher than the hospital’s FY 1996 ratio

- The multiplier factor that enhanced teaching hospital payments were reduced over a four-year period from 1.89 to 1.35

- FTE resident counts were calculated using a three-year moving average in order to lessen the financial impacts of any reductions in residents.

- DME was subject to the resident cap and moving average method as well.

Sections 4622 and 4624 carved out IME and DME payments from the Medicare premiums paid to Medicare managed care plans and added them directly to fee-for-service payments to teaching hospitals.

1.4 Summary of BBRA and BIPA GME Provisions

Believing that the initial reductions in teaching hospital payments were too severe, Congress in the 1999 Balanced Budget Refinement Act (BBRA) adjusted the downward trend in the multiplier factor so that the lower 1.35 factor would not be applicable until a year later in October, 2001. It also raised the factor applicable beginning in October, 1999, from 1.47 to 1.60. Then, again, in the 2000 Benefits Improvement & Protection Act (BIPA), Congress further postponed the 1.35 factor until October 1, 2002. While beyond the timeframe of our evaluation, we note that the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 further postponed the 1.35 factor until October 1, 2007.

The BBRA also included a provision that put floors and ceilings on the allowable per resident payment amounts for DME payments. This provision responded to Congressional concerns that some states enjoyed extraordinarily high faculty “loading factors” applied to resident wages that are fairly constant across the country. The BBRA also allowed rural teaching hospitals to increase their residents because of the perceived shortage of physician services in rural localities.

1.5 Summary of Key Findings

1.5.1 Trends in Residents, Nation-wide

The number of residents in teaching hospitals has increased 2.5-fold from 1960 to 2000. The rate of growth in residents has slowed in the post-BBA period according to AAMC figures, but no reduction in growth rates was found for actual residents reported on Medicare Cost Reports. Between 1995 and 2000, there was a net increase of 328 new resident programs—two-thirds in the medical specialties. Surgical specialty programs actually decreased since 1995.

The mix of residents has changed dramatically over 40 years. For example, females comprise 38 percent of residents in 2000 versus only 9 percent in 1968. Foreign medical graduates fell as a percent of all residents through the 1970-1990 period before rising rapidly again to comprise one-quarter of all residents by the year 2000.

The Mid-Atlantic region trains fully one-quarter of all residents, but New York, the state with the most residents, saw a small reduction in residents after 1995. The New England, South Atlantic, and West South Central regions all saw modest increases in residents between 1995-2000 while the North Central region experienced the largest decrease.

1.5.2 Hospital Participation in the New York Resident Reduction Demonstration

At the peak, 49 teaching hospitals participated in the New York Voluntary Resident Reduction Demonstration. However, only 7 completed the full 6 years of the demonstation. These 7 all met their resident reduction targets of 20-25 percent.

A hospital's share of IMG residents was the most important predictor of participation as well as completing the demonstration. A hospital with an IMG share one standard deviation above the New York mean was two-thirds more likely to participate.

Academic Medical Centers were more likely both to participate and to withdraw. None of the 6 AMCs completed the demonstration. All safety net public hospitals in New York City initially participated (HHCs), but only 5 completed the demonstration.

Hospitals that were able to maintain or increase their inpatient volumes were less likely to participate at all. Interviews with managers in hospitals that eventually withdrew also noted the pressure to retain residents given their strong patient demand. Higher Medicare patient shares were negatively associated with participation and resident reductions.

1.5.3 Hospital Volume, Payer Mix, and Finances in the New York Demonstration

The 7 hospitals completing the demonstration experienced averaged 7 percent annual reductions in discharges. Withdrawals and never-participants averaged small positive volume growth. Continuing participants also experienced minimal outpatient volume growth, including outpatient surgery. Withdrawals and never-participants experienced strong outpatient clinic and surgery growth.

New York City hospitals are remarkable in their shares of Medicaid and uninsured patients. This was especially true of continuing participants who averaged 55 percent Medicaid and 10 percent uninsured patients at the beginning of the demonstration. Conversely, their Medicare share of days was only 22 percent. Medicare and Medicaid shares remained constant for continuing participants over the first four years of the demonstration for which we have data. At the same time, their share of managed care days more than doubled to 14 percent while their share of uninsured days fell. Thus, there is no evidence that in reducing their resident complements, continuing participants also restricted access to the uninsured. In fact, the uninsured share fell consistently in New York among all downstate teaching hospitals—probably due to the strong economic growth present in the second half of the 1990s.

Continuing participants were in far worse financial condition compared to other New York teaching hospitals. By 2001, all hospital groups had negative operating and total margins. Continuing participants exhibited even lower margins than withdrawals and never-participants. This is largely explained by the dominance of non-profit public hospitals among the 7 hospitals completing the demonstration.

1.5.4 Resident Reduction Strategies in the New York Demonstration

By 2001, two years before the end of the demonstration, continuing participants had achieved a 25 percent reduction in residents. This is compared to a 2 percent reduction among New York City withdrawals and a 4 percent increase among never-participants.

All residency groups showed declines among continuing participants through 2001. Surgery residents experienced the largest declines: 53 percent. Hospital-based radiologists, anesthesiologists, etc., experienced similar percentage declines. Even primary care specialties experienced declines in residents, but participants were able to maintain their share of primary care residents. This was a challenge given the disproportionate share of primary care in all residents among continuing participants. Withdrawals exhibited only minor reductions in hospital-based residents while medical and surgical residents were flat (versus 35-50 percent declines among continuing participants).

Although continuing participants experienced a 22 percent decline in IMGs, the share of IMGs in all residents actually increased given even larger declines in USMGs.

The 7 continuing participants eliminated 54 resident specialty programs of out 127, a 43 percent dissolution rate. One hospital accounted for fully one-half of all program eliminations because it shifted all its residents to another partner hospital. Programs commonly eliminated were anesthesia, orthopedic surgery, and pathology.

1.5.5 Quality & Access Impacts in the New York Demonstration

Quality of care in demonstration and control hospitals was analyzed using New York all-payer claims data (SPARCS). Demonstration period trends in risk-adjusted mortality rates for AMI, stroke, and pneumonia did not differ between continuing participants, withdrawals, and never-participants, implying no adverse outcome impacts to reducing residents. Continuing participants showed a decrease in risk-adjusted Cesarean deliveries relative to other hospitals—an indication of improving quality. A decline in vaginal delivery following an earlier Cesarean delivery was observed in all hospital groups and cannot be attributed to the demonstration. No differences were found in the AHRQ two patient safety indicators, obstetric trauma and failure-to-rescue. All groups showed improvements in failure-to-rescue rates over the study period.

While the decline in inpatient volumes might be an indication of reduced access in continuing participants, these declines had begun before the demonstration started. The causality, we believe, has declining volumes encouraging managers to reduce resident counts rather than the other way around. Also, while continuing participants experienced larger declines in Medicaid volume compared to control hospitals, so did the seven HHC hospitals that withdrew from the demonstration. Any reduction in Medicaid volumes, more likely, was due to heightened competition for Medicaid patients subsequent to the sunsetting of the rate setting commission in New York.

Continuing participants did exhibit large declines in trauma-related services, ER and mental health admissions, and substance abuse services compared with other hospitals. Again, these trends cannot be ascribed to the demonstration and reduction in residents for the most part. First, some of these trends began before the demonstration. Second, a shift in ER ambulance companies resulted in a re-direction of emergency patients away from participants. Net access to emergency services actually increased over the study period, although not necessarily in continuing participant facilities.

Interviews with community leaders and health advocates found that very few were aware of the resident reduction demonstration. This is *prima facie* evidence that the reductions, by themselves, had little to do with the dramatic changes occurring in hospital care. Rapidly declining volumes from changes in the payment system and heightened Medicaid competition had much larger effects. Greater on-site involvement of attendings mandated by HHC Central Office, along with shorter wait times for clinic appointments, were also noted by community activists as positive access improvements.

1.5.6 BBA-BBRA Impacts on National Trends in Residents

From 1990-2001, FTE residents reported on hospital cost reports grew from 65,000 to 79,500. Beds were shrinking over this period. The result was a substantial increase in the intern/resident-to-bed (IRB) ratio from .18 to .24. The number of hospitals with residents also grew of this decade by roughly 10 percent.

While the BBA had capped the number of residents allowed for Medicare payment, it was not a “hard” cap. Between 1996 and 2001, the adjusted cap actually increased 9 percent, or 6,500 residents. New resident programs accounted for less than one-half of the increase in the cap. Actual allowed residents increased only 4 percent over the same period. The paradox is explained by the fact that some hospitals had declining residents relative to their “fixed” cap while others were expanding both their cap and resident counts (although not necessarily up to their new cap). Actual medical residents reported on the cost report increased 8 percent between 1996-2001. Rural residents increased 27 percent, although their net increase (274 residents) was dwarfed by the increase in urban residents (5,271).

1.5.7 Impact of the 3-Year Rolling Average Method of Calculating Residents

Although Congress intended the 3-year rolling average method of calculating allowable residents to soften the payment impacts of reducing residents post-BBA, analysis showed that about one-third of hospitals actually had resident growth. Applying the rolling average to this group actually saved 22 percent in 1998 on their IME payments and another 5 percent as late as 2001. For the much larger group with declining residents over at least a three-year period, the additional Medicare IME outlays were about 3-4 percent. Across all groups, the 3-year rolling average saved Medicare roughly 9 percent in IME outlays in both 1998 and 1999, falling to 2.5 percent annually in 2000 and 2001.

1.5.8 Financial Performance of Teaching Hospitals Post-BBA

Teaching hospitals experienced very strong revenue growth over the entire period after Medicare's PPS hospital payment system was implemented. Between 1985-1996, the average growth in revenues was 8.5 percent annually. Growth rates slowed in the post-BBA period, but only to 6.5 percent, on average. Medicare PPS revenues in teaching hospitals, by contrast, slowed much more dramatically.

Teaching hospital operating margins were consistently negative and became more so during the post-BBA period. Total margins, however, remained a fairly strong 3-3.5 percent annually. Hospitals more dependent upon Medicare actually had better margins than less dependent hospitals. Their better performance is likely due to less dependence upon Medicaid and uninsured patients. For example, government teaching hospitals experienced operating margins approaching -10 percent in the late 1990s with total margins insignificant from zero.

1.5.9 GME Payment Reductions as a Share of Revenues

GME payment reductions averaged a -$1.25 million per teaching hospital by 2001 given rollbacks in payments. While substantial, the average loss is only about one-half of one percent of hospital total revenues (and 2.5 percent of PPS revenues).

This loss varied significantly by type of hospital. First, the reduction, or "bite," includes the elimination of IME add-ons to outlier payments, which would disproportionately impact high outlier teaching hospitals. By contrast, the bite also includes positive IME and DME add-ons for the carve-out of Medicare managed care patients now paid directly to teaching hospitals. A decomposition analysis showed that by 2001, the reduction in the IME multiplier plus the "soft" cap on the IRB accounted for about 20 percentage points of the 17 point reduction in IME payments. This was offset by a 3-point gain in the PPS payment base as managed care carve-out payments came to dominate the lost outlier IME add-on payments.

1.5.10 Medicare IME & DME Subsidies and the Negative Resident Wage

In taking on more residents, a simplified economic model predicts that hospitals consider the true, marginal net wage of residents, a wage that is reduced by the DME and IME subsidies provided by Medicare. Simulations indicated that the vast majority of teaching hospitals actually face a negative marginal wage after accounting for these two subsidies. How negative the wage is depends on Medicare dependency, the average PPS payment per discharge, the DME add-on for faculty-related teaching costs, and the IRB. Hospitals with at least 60 percent Medicare patients, a high federal payment per discharge, and a high teaching loading factor onto resident salaries, may enjoy negative wages 3-4 times the salary actually paid the additional resident.

Based on actual 2001 cost report data, the average teaching hospital enjoys a marginal GME subsidy of $106,000 while incurring a roughly $40,000 resident stipend, or wage (fringe benefit costs would add 25 percent). The result is a negative wage of -$67,000. This is why resident training programs are referred to as another "line of business" in many teaching hospitals. Decomposition of the subsidies and marginal wages showed a strong positive dependence upon Medicare shares of days. Rural hospitals actually enjoy a slightly higher marginal subsidy that is likely due to their greater Medicare dependency. Similarly, teaching hospitals in states like South Dakota and Montana enjoyed the highest Medicare GME subsidies per additional resident, although they train a small fraction of residents compared with other states. Their subsidy was 25-50 percent above the average paid in New York. Conversely, teaching hospitals in Nevada are subsidized at only one-half the rate as their counterparts in the most highly subsidized states—again due primarily to their low Medicare dependency.

1.5.11 Impact of BBA-BBRA Payment Changes on Hospital Demand for Residents

To test for the impact of GME payment reductions in the post-BBA period, we estimated a multi-variate model with the individual hospital percent change in residents between 1996 and 2001 as the dependent variable. Key variables included the IME and GME bite measures, the marginal effective wage facing the hospital for residents, and the change in inpatient volumes. Other hospital and area characteristics were also held constant (e.g., rural location, ownership, census area).

A significant positive association was found between the size of the Medicare bite and growth in resident demand. For example, a hospital facing a negative bite of -$20,000 per resident was predicted to have resident growth of 4.1 percent while a hospital with a positive bite of +$20,000 had predicted resident growth of 15.7 percent. Moreover, hospitals facing a positive marginal wage that they would have to pay out of other hospital revenues besides the Medicare GME subsidies had resident growth about 5-8 percentage points less.

As predicted, hospitals with strong positive growth in inpatient days had higher resident growth. Alternatively, hospitals experiencing significant volume declines reduced their residents.

Other hospital variables associated with positive resident growth holding Medicare subsidies and volumes constant included: Major (IRB> .25) teaching hospitals; Southern hospitals; and hospitals with initially high occupancy rates. COTH and rural hospitals did not exhibit above-average resident growth once all other variables were held constant.

1.5.12 IMG Location Post-Residency

While policy makers are concerned that Medicare is subsidizing the training of International Medical Graduates (IMGs) who then return to their native country, we find that the vast majority remain in the United States. Of 1998 IMGs in residency programs, 72 percent were in active practice in the U.S. in 2004 (ignoring non-Medicare specialties such as pediatrics). In addition, up to another 16 percent, like their USMG colleagues, are practicing in the VA or military system, in HMOs, or otherwise involved in health care research or administration. One reason why so many IMGs remain in the U.S. after their residency is that at least 50 percent are either U.S. native-born citizens, naturalized citizens, or have permanent resident status.

The country's return on investing in the training of IMGs depends upon which hospitals they do their residency, their choice of specialty, and where they locate their practice post-residency. IMGs are more likely to perform their residencies in teaching hospitals located in lower income areas than are USMGs. Many see patients in the nation's inner city "safety net" hospitals. IMGs, compared with USMGs, disproportionately specialize in primary care medicine while USMGs are 4-times more likely to specialize in surgery. IMGs, post-residency, are more likely than USMGs to locate their practice in rural parts of 40 states. In three-quarters of urban/rural areas in the country, IMGs locate in poorer communities than do USMGs. The majority of New York City residents, 15 percent of all residents in the U.S., do not stay in the City or even the state. Roughly two-thirds of IMG residents trained in New York City leave the state. Numerically, the South Atlantic, East North Central, West South Central, and Pacific states "recruit" the largest numbers of New York City residents.

1.6 Overview of Report

The rest of the report is in three major parts and sections. **Part I** includes section 1 and two subsequent sections that describe **trends in GME enterprise** (Section 2) then present a general **model of teaching hospital demand for residents** (Section 3). The conceptual model frames the various analyses and prepares the reader for unanticipated results in future sections of the report; most notably, the continued increase in residents in the post-BBA period even with lower Medicare subsidies.

Part II includes five sections devoted to the evaluation of the **New York resident reduction demonstration**. Section 4 is a detailed empirical description of demonstration participants, why so many participated initially, and why so few actually completed the demonstration. Section 5 presents information on hospital resident reduction strategies and the program specialties that were affected the most. Section 6 presents data showing the declines in inpatient volumes, shifts in payer mix, and financial performance for the three comparative groups: the 7 continuing participants; the withdrawals; and the never-participants. Volume declines were instrumental in the decision to remain in the demonstration. Section 7 provides quantitative analysis of impacts of reductions on access to care. We also summarize qualitative responses regarding access based on interviews with local community health advocates. Section 8 provides quantitative results of impacts on the quality of care in three domains: inpatient mortality; procedure rates; patient safety indicators.

Part III includes two sections addressing the impacts of the **BBA and subsequent legislation on national trends in residents**. Section 9 begins with a summary of the basic changes in Medicare GME payment rates, followed by analyses of trends in Medicare adjusted resident caps and actual versus allowed residents for payment purposes. The next sub-section shows trends in teaching hospital revenues and margins pre/post-BBA and the size of the Medicare GME payment reductions relative to overall revenues. This is followed by figures on the size of the DME and IME subsidy and how they generate a "negative" marginal effective resident wage for teaching hospitals on average. The final sub-section presents multi-variate analysis of the impacts of volume and payment reductions on the growth in residents for over 800 teaching hospitals in the post-BBA period. Finally, Section 10 addresses the important policy question of International Medical Graduates (IMGs) and where they locate after completing their residency. This research involved novel linking of CMS 1998 IRIS file data, used to validate hospital resident counts, with physician UPIN registry information on location of practice in 2004.

SECTION 2
TRENDS IN GME ENTERPRISE

2.1 Introduction

Vital to understanding the effects of the BBA and BBRA on residency programs and teaching hospitals is an understanding of the structure of residency training in the United States. The complexity and scope of graduate medical education mirrors that of the medical system in general. Over time, many new specialties have been created with the advance of medical knowledge, which has resulted in a large increase in the numbers of residents, residency programs, and teaching hospitals. Underlying these aggregate increases is a great amount of variation over time and across specialties in the consolidation and division, decline, and growth of specialty programs. Without understanding the underlying driving forces behind the U.S. GME enterprise, attributing changes as solely due to Medicare payment policy changes is folly.

This section consists of four major parts. The first part provides background on the organization of both undergraduate and graduate medical education in the United States. It describes how residents are matched with programs for their advanced training, the role of the Accreditation Council on GME in approving resident programs, how hospitals are paid by Medicare for residents, and what non-payment forces are shaping trends in resident training. The second presents trends in the size of GME enterprise in terms of total residents by year since 1960. Trends in resident counts are then presented for the 1995-2003 period by gender, race/ethnicity, U.S. versus foreign graduate status, and specialty. The third presents trends in approved programs and sponsors decomposed by four broad specialty groups: generalist, medical specialist, surgical specialist, and support specialist (e.g., radiology). The fourth presents levels and trends in both the number of residents and programs by area of the country (the nine census divisions) as well as by the 50 states plus the District of Columbia.

2.2 Background

2.2.1 Description of Medical Education

Medical education takes place in two stages and thus, broadly speaking, presents two potential targets for efforts aimed at altering the number and specialty mix of physicians. The first stage is undergraduate medical education (UME), generally consisting of the four years that students spend in medical school. The second stage is graduate medical education (GME), a phase which usually begins upon completion of medical school and consists of the period of residency training and, for those who chose further specialization, subsequent fellowship training. Most residencies are between three and five years in duration; fellowships generally add from one to several years of additional training.

Undergraduate Medical Education

Traditionally, UME has been divided into two blocks or segments, each two years in length. During the first two years of medical school (often referred to as the pre-clinical years), students focus primarily on developing a deeper understanding of the basic sciences underlying modern medicine, including biochemistry, microbiology, anatomy and physiology, immunology, pathophysiology, genetics, and pharmacology. Students also participate in introductory clinical activities during these first two years as they are introduced to the basics of taking a medical history and conducting a physical examination.

The second two year segment of UME (usually referred to as the clinical years) focuses on instruction in the major clinical disciplines, such as surgery, internal medicine, obstetrics and gynecology, pediatrics, and psychiatry. The goal of the clinical years is to "…familiarize students with the structure, function and behavior of the human organism in health and disease, to acquaint them with the causes, physiological disturbances and the natural history of various diseases, to provide an introduction to the principles of therapeutics and surgery, and to present the environmental and social influences" (Ludmerer, 1999, p. 212).

A second goal of the clinical years of UME is for students to choose the focus of their graduate medical training. It is during the clinical years that most students will select a generalist or a specialist pathway (e.g., family practice or primary care internal medicine versus radiology, anesthesia, or orthopedics). Many medical schools have instituted mandatory primary care clinical experiences during the third and fourth years, the goal of which is to increase the number of students who choose generalist fields.

Yet challenges exist to shaping the work force through interventions at the UME level. First, the funding of UME is largely through tuition and fees, state subsidies (including allocations to schools), and philanthropy. The absence of a large and consistent direct federal component to the funding reflects, and helps to ensure, limited federal control over the numbers and career choices of undergraduate medical students. Second, a significant portion of the physicians who receive GME training and join the physician workforce in the U.S. receive their undergraduate medical training outside the United States.

Graduate Medical Education

Graduate medical education begins after medical school and consists of the residency and fellowship components of physician training. This is the stage of experiential learning in the actual practice of medicine. As noted above, the planning for graduate training generally begins during students' fourth year of medical school, when students apply for a residency position in their field of choice. A matching process (informally known as "the match"), in which medical student and residency program preferences for one another are aligned as closely as possible, results in the "filling" or assignment of students to particular residency programs. Almost immediately after graduation from medical school, the new graduates begin their graduate phase of training by starting their residency at their assigned program. Some residency programs are preceded by an initial post-graduate year of training referred to as an internship.

Hospitals which participate in the education of residents or medical students are often referred to as teaching hospitals. The scope of the teaching enterprise can vary enormously from one teaching hospital to the next. Large teaching hospitals may have dozens of training programs representing most or all of the major specialties and subspecialties, while smaller teaching hospitals may have only one or a select group of programs. Commonly these might include internal medicine, family practice, or pediatrics. Many teaching hospitals, but not all, are affiliated with medical schools.

The program is the fundamental organizational unit of GME enterprise. Programs can exist within a single teaching hospital or might extend across a number of hospitals and even to non-hospital clinical settings such as ambulatory practices (so that, over the course of a year, residents may spend time in several hospitals or other clinical sites). For example, one relatively large emergency medicine residency program in the Northeast has its residents "rotating through," or spending time, in five different hospitals. Such arrangements mean that large and small teaching hospitals may share residents. Thus medical students who apply and are matched into a single residency program may subsequently work at a number of participating sites. Oversight of these residents is the responsibility of both physician supervisors at the individual sites and program directors.

Sponsors are those entities which take primary administrative responsibility for a residency or fellowship program. They may be hospitals, medical schools, consortia, or even departmental subunits within a hospital or medical school. In the above example of an emergency medicine residency program, the sponsor is one of the five hospitals who collectively constitute the training program.

The fundamental task for residents in GME is to develop clinical skills primarily by providing direct patient care under the supervision and with the instruction of senior physicians, who make up the clinical faculty of medical schools and their associated teaching institutions. GME also includes an enormous amount of didactic training conveying the knowledge base essential to diagnosis and treatment. Didactic sessions include attending rounds, seminars, lectures, and reading in specific fields relevant to practice. At the completion of their residency, they should be capable of handling independently all the major medical problems in their core disciplines.

The content and quality of graduate medical education is supervised by the Accreditation Council on Graduate Medical Education (ACGME), which includes representatives of all major medical disciplines ranging from surgery to pediatrics to radiology and pathology. Under the aegis of the ACGME, 24 Residency Review Committees (RRCs) accredit all residency programs in their disciplines within the U.S. RRCs visit each program on a regular basis, review the content of the clinical and didactic programs in which residents participate, interview residents concerning their experiences, and make recommendations for improvement.

Another assurance of the competency of graduating residents is provided by medical disciplines themselves through the process of board certification. National panels of physicians from each major discipline (Medical Specialty Boards) meet regularly and compose examinations (National Certifying Exams). Physicians who pass those exams receive "board certification," which provides further evidence that they have mastered the content of their disciplines. Some boards now require that physician's take these exams at periodic intervals throughout their careers (a process known as "recertification") if they wish to remain board certified. Passage of national boards is not a precondition of licensure and practice, and physicians are free to advertise themselves as practitioners of a particular discipline without board certification.

Since graduate medical education is comprised of residency and fellowship training, GME importantly affects the number and mix (generalists versus specialists) of physicians who complete required training and are eligible to join the physician workforce. Constraining the number and composition of residency and fellowship positions is, thus, a means by which physician supply could be influenced.

2.2.2 Funding of Graduate Medical Education

Major sources of funding for graduate medical education consist of Medicare payments, excess revenues from clinical activities of faculty, state subsidies, state Medicaid payments, and philanthropy. The federal government, through Medicare, is the single largest explicit supporter of graduate medical education. Since international medical graduates (IMGs) receive their U.S. training in the GME enterprise, they can be substantially affected by policies affecting GME. Federal policies regarding the number and mix of physicians trained, including those originating from foreign medical schools, can therefore be influenced via Medicare payments to hospitals (The Commonwealth Fund, 2002).

2.2.3 Balanced Budget Act (BBA) and Graduate Medical Education

In 1997, BBA provisions on graduate medical education mandated limitations in the growth of GME and provided incentives for voluntary reductions in the number of physicians in training. The mandatory provisions of the BBA reduced the multiplier component of the indirect payment formula and capped the number of residents used to calculate Medicare GME payments. The incentives for voluntary reductions encouraged hospitals to reduce the overall number of residents and fellows trained while maintaining or increasing the proportion trained in generalist fields.

The major mandatory provisions of the BBA consisted of the following items affecting indirect payments to hospitals: (1) a cap on the number of residents reported on the hospital's Medicare Cost Report for 1996, the year prior to the BBA; (2) a reduction in the IME adjustment factor; (3) a constraint on the intern-and-resident to bed (IRB) ratio for payment purposes to a level no higher than that reported in 1996; and (4) that resident counts will be calculated on the basis of a three-year rolling average. The BBA mandatory revisions affecting direct GME payments to hospitals consisted primarily of (1) a cap of the number of residents (using the same formula as for indirect payments) and (2) the use a three-year rolling average resident count, also as for indirect payments.

In addition to the mandated payment revisions, the BBA included a voluntary resident reduction program modeled after the New York Medicare GME Payment Demonstration. The BBA program, like the New York demonstration, was to allow for transition payments to be made to participating hospitals which reduced their resident counts by at least 20 percent. Only two hospital groups are participating in this program. The BBA also established a demonstration under which consortia, rather than individual institutions, would be eligible for DME payments and consequently through which net resident reductions would be calculated across the consortium rather than for individual institutions. However, no hospitals applied to participate in this demonstration.

2.2.4 Other Forces Shaping Graduate Medical Education

A number of forces other than the BBA could have influenced the GME enterprise in the post-BBA era. For example, in recent years, insurers have begun demanding more explicit involvement in patient care from attending physicians in hospital settings. One consequence has been to reduce the marginal value of the resident physician, who may be doing less independent work. In some settings resident physicians can even be seen as impediments to optimal efficiency.

Also, resident and medical student perceptions of the market may have influenced their own career choices. When an oversupply of specialists was widely discussed, graduating medical students and residents expressed an increased interest in generalist fields, such as general internal medicine and family practice, and a declining interest in specialties such as ophthalmology, orthopedics, and anesthesiology.

2.2.5 Key Research Questions

The following are the key research questions identified for our report on the GME enterprise:

1. How has the overall size of the GME enterprise changed in recent years?
2. How much has the overall composition of the GME enterprise changed in recent years?
3. How have the size and composition of the GME enterprise changed since the base year 1997, prior to the BBA?
4. How has the geographic dispersion of the GME enterprise changed in recent years?

2.3 Methods

2.3.1 Description of Data Source

Every year in an appendix to the annual graduate medical education issue, *JAMA* publishes a number of tables of resident and residency program counts by specialty, ethnicity, state, and citizenship/visa status. In addition, the number of first year (PGY-1) residents by specialty is given as well as the expected number of residency positions available for the coming year. These tables are constructed using the American Medical Association (AMA) Annual Survey of Graduate Medical Education Programs and the National Graduate Medical Education Census, conducted jointly by the AMA and the Association of American Medical Colleges (AAMC).

2.3.2 Data Limitations

Our analyses of these data are limited to the published cross-tabulations. All available data are aggregated into a standard set of *JAMA* tables that vary in detail over time. Some trends, such as in national resident counts, can be tracked back to 1960 while others, such as the racial/ethnic mix of residents, are only available for the last few years. In general, trends are presented for the 1995-2003 period with a few trends extending backwards one to three decades. Furthermore, the data are collected at the program, not the provider, level. Thus, hospital-specific stratifications are not possible. In addition, the data may be of residency positions, not full-time equivalent (FTE) residents. Finally, since the data are collected with a voluntary survey there is the possibility of incomplete reporting. This may be especially true for very small programs in community hospitals.

In principle, the ideal data to use for the analyses in this report would be CMS' Intern and Resident Information System (IRIS) data, submitted to the CMS Fiscal Intermediaries (FIs) by each teaching hospital, then passed on to CMS for processing. These data provide information on each resident rotation in every teaching hospital in the United States, including the hospital where the rotation occurred and the duration of the rotation, as well as the resident's specialty, IMG status, and gender. In contrast with the *JAMA* data, the IRIS data would permit hospital-level cross-tabulations and multivariate analyses, and would presumably not be subject to survey non-response, particularly from small community hospitals. Unfortunately, complete IRIS data beyond 1997–1998 were not available for the analyses presented in this report.[1]

2.4 Empirical Results

2.4.1 Size of the Graduate Medical Education Enterprise

The overall size of the GME enterprise has increased dramatically in the United States over the last 40 years. The total number of residents in U.S. clinical facilities has increased from 37,562 in 1960 to 99,964 in 2003 (see ***Table 2-1***). However, between 1993 and 1997 the total number of residents remained relatively stable averaging about 98,000 despite minor fluctuations between individual years. From 1997 through 2001 (post-BBA), the total number of resident physicians decreased by 1,733, or about 1.8 percent. Then, after 2001, resident growth was positive (+3,554), resulting in a net increase of 1,821 (1.9 percent) over the 1997-2003 period.

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[1] Processing of IRIS data beyond 1995 had been delayed for a few years at CMS. The agency is currently bringing the IRIS data up to date, but data beyond 1998 are not yet available, making post-BBA changes in resident counts impossible. In consultation with CMS, we used the JAMA data as a substitute. The scope of possible analyses is diminished, but trends in GME enterprise for a few years after the enactment of the BBA can be analyzed.

Table 2-1
Trends in resident physicians, 1960-2003

Year	Total Number of Residents	Number of IMG Residents	Percent IMG Residents[a]	Number of USMGs Residents[b,c]	Percent USMG Residents[d]
1960	37,562	9,935	26.4%	27,627	73.6%
1970	51,015	16,307	32.0	34,708	68.0
1980	61,465	12,078	19.7	49,387	80.3
1990	82,902	14,914	18.0	67,988	82.0
1991	86,217	17,279	20.0	68,938	80.0
1992	89,368	19,264	21.6	70,104	80.0
1993	97,370	22,721	23.3	74,649	76.7
1994	97,832	23,499	24.0	74,333	76.0
1995	98,035	24,982	25.5	73,053	74.5
1996	98,076	24,703	25.2	73,373	74.8
1997	98,143	25,531	26.0	72,612	74.0
1998	97,383	25,415	26.1	71,968	73.9
1999	97,989	25,880	26.4	72,109	73.6
2000	96,806	24,707	25.5	72,099	74.5
2001	96,410	25,403	26.3	71,007	73.7
2002	98,258	25,783	26.2	72,475	73.8
2003	99,964	26,577	26.6	73,287	73.4

NOTES:

[a] Percent IMG Residents calculated as Number of IMG Residents/Total Residents x 100

[b] Includes USMG, DO, Canadian, and Unknown Residents

[c] Number of Non-IMG Residents calculated as Total Number of Residents – Number of Non-IMG Residents

[d] Percent Non-IMG Residents calculated as Number of Non-IMG Residents/Total Number of Residents x 100

SOURCE: Data from *JAMA* Medical Education Issues; www.jama.com; June 16, 2005

The IMG share of all residents fell from 1960 through 1990 before rising again to 1960 levels. IMGs have remained about one-quarter of all residents over the post-BBA period.

Among the many reasons for the growth in the number of residents over the last four decades have been changes in the undergraduate medical education (UME) enterprise. Over the last 40 years the number of medical students in the United States more than doubled from 30,288 in 1960 to 66,489 in 1999 (***Table 2-2***). Virtually all of this growth occurred between 1960 and 1980, when the number of fully accredited four year schools increased from 81 to 115, and the average entering class more than doubled in size from 8,069 to 16,590 nationally (Ludmerer, 1999). However, since 1980, the total number of medical students has remained virtually constant.

Another, and perhaps more sensitive, indicator of recent changes in the GME enterprise is the number of first-year residents enrolled in accredited programs since programs generally expand or contract by adding or subtracting first year residency positions rather than completely closing whole programs or removing final year positions (see ***Table 2-3***). From 1995 to 2003, the total number of first-year resident physicians increased slightly from 33,993 to 34,760, representing a net increase of 767 residents. From 1997 to 2003, representing the post-BBA period, the total number of residents decreased by 490. However, it is important to note that there has been significant year to year variation in the total number of first-year residents. For example, from 1998 to 1999, the number of first-year residents increased by 1,464. From 1999 to 2000, the total number of first year residents decreased by 2,980. Then, between 2000 and 2003, first-year resident counts increased by 919. It is unclear from the available data why the number of first year positions varied so dramatically over a year, and, as a result, care should be taken when interpreting year-to-year changes.

2.4.2 Trends in the Gender Mix of Residents

One indicator of changes in the gender distribution of the GME enterprise is the percentage of medical school graduates who are women (see ***Exhibit 2-1***). From 1968 to 1998 the percentage of first year medical students who were female increased five-fold from nine percent to 45.7 percent. It is not surprising that, given the growth in the number of females graduating from medical school in the U.S., their representation in the GME enterprise has grown as well. From 1985 to 2003, the total number of female resident physicians more than doubled from 19,562 to 40,888 (see ***Table 2-4***). By 2003, over four of every ten residents were female.

2.4.3 Trends in the Race/Ethnicity Mix of Residents

Table 2-5 shows the trends in the participation of underrepresented minorities (URMs) in the GME enterprise. For the purpose of this report, URMs are defined as residents self-identified as Black or Hispanic (Mexican American, Puerto Rican, or other Hispanic). Non-URMs are residents identified as white non-Hispanics and Asian/Pacific Islanders. As shown in Table 2-5, the percentage of URM residents has grown slightly from 10 to 12 percent for both groups combined from 1995 to 2003. According to the 2000 U.S. Census, African Americans and

Hispanics constituted 22 percent of the U.S. population aged 18 years and over (U.S. Bureau of the Census, 2000). Hence these two groups, together, are under-represented by almost a factor of two in resident training.

Table 2-2
Changes in the size of the U.S. undergraduate medical education enterprise, 1960-1999

Year	Number Fully Accredited Four-Year Medical Schools	Number of Medical Students
1960-61	81	30,288
1965-66	84	32,835
1970-71	87	40,487
1975-76	109	55,818
1980-81	115	65,189
1985-86	126	66,585
1990-91	125[a]	65,163
1995-96	124[b]	66,970
1998-99	124	66,489

NOTES:

[a] The decrease of 126 to 125 is the result of the closure of the Medical School at Oral Roberts University in 1990-91.

[b] The decrease from 125 to 124 is the result of the merger of Medical College of Pennsylvania and Hahnemann University in 1995.

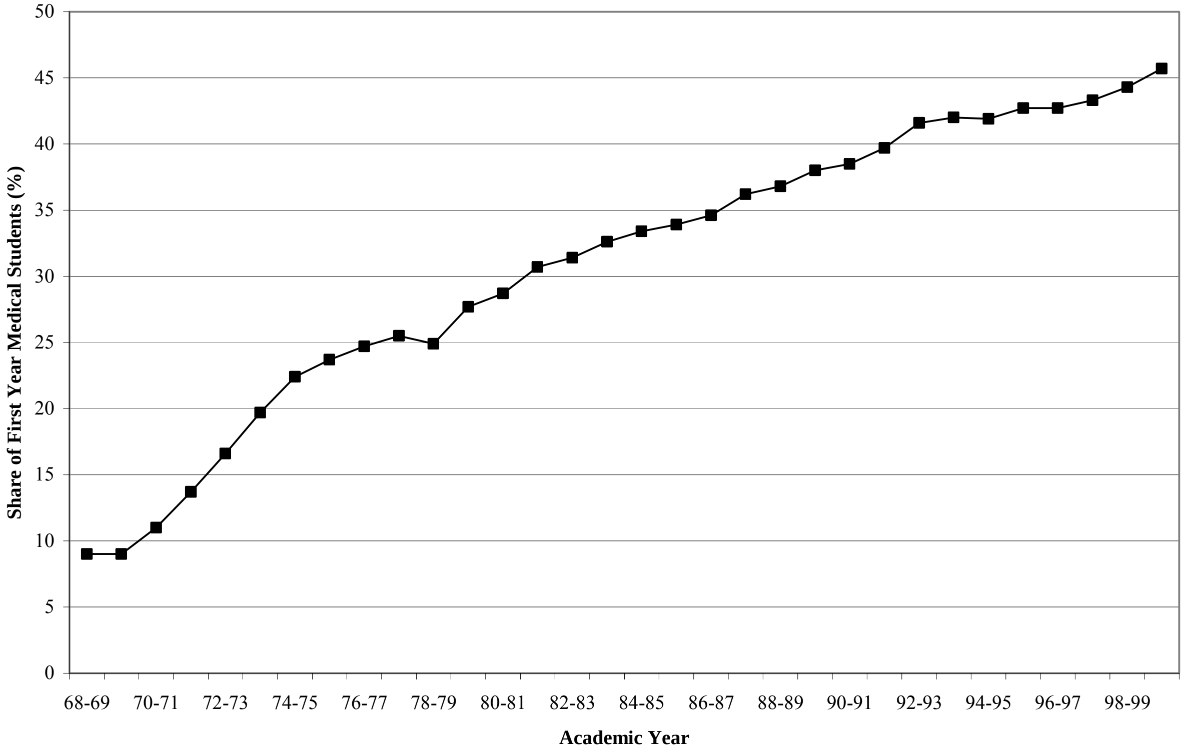
SOURCE: *AAMC Data Book: Statistical Information Related to Medical Schools and Teaching Hospitals*, January 2000. Washington DC; Association of American Medical Colleges.

Table 2-3
Trends in first year residents, 1995-2003

Year	Total Number of First Year Residents	Change From Previous Period
1995	33,993	--
1996	34,835	842
1997	35,250	415
1998	35,357	107
1999	36,821	1,464
2000	33,841	-2,980
2003	34,760	919

SOURCE: Data for 1995-2000 from *JAMA* Medical Education Issues 1996-2001; year 2003 from www.jama.com, June 16, 2005.

Exhibit 2-1
Trends in first year enrollment of women in medical school, 1968-1999



SOURCE: *JAMA* Medical Education issues, 1968-1999

Table 2-4
Trends in the gender mix of resident physicians, 1985-2003

Year	Number of Female Residents	Percent of All Residents Who Are Female
1985	19,562	27.0%
1995	33,301	34.0
1996	33,915	34.6
1997	35,733	36.4
1998	36,359	37.3
1999	37,382	38.1
2000	37,269	38.5
2003	40,888	40.9

SOURCE: Data from *JAMA* medical education issues: 1986, 1996, 1997, 1998, 1999, 2000, and 2001; year 2003 from www.jama.com, June 16, 2005.

Table 2-5
Trends in the race/ethnicity mix of resident physicians, 1995-2003

	Non-Under-Represented Minorities		Under-Represented Minorities	
Year	% White	% Asian	% Black	% Hispanic
1995	63%	20%	5%	5%
1996	58	19	5	5
1997	57	18	5	5
1998	57	18	5	5
1999	56	19	5	5
2000	61	22	6	5
2003	54	25	5	7

NOTE: Percentages do not sum to 100% due to inconsistent coding of race categories in several of the study years.

SOURCE: Data from *JAMA* Medical Education Issues 1996-2001; year 2003 from www.jama.com, June 16, 2005.

Among non-URMs, the percentage of all resident physicians who were Asian increased from 20 to 25 percent between 1995 and 2003 while the percentage of residents who were white (non-Hispanic) decreased from 63 to 54 percent. As a reference, the percentage of the U.S. population aged 18 years and older who were Asian was 3.7 percent and the percentage white was 72 percent. Hence, Asians are over-represented by a factor of 6.7 while whites are somewhat under-represented. In 2003, Asian residents were 35 percent of all internal medicine residents; 36 percent in nuclear medicine, 32 percent for physical rehabilitation; and 29 percent for pathology.

2.4.4 Specialty Distribution of GME Enterprise

First Year Resident Preferences

The earliest indicator of the future specialty mix of the GME enterprise is the specialty training intentions of graduating medical students. Specialty training intentions are the responses of graduates to a survey conducted at the end of medical school that asks them to choose the specialty or subspecialty in which they intend to seek residency training. ***Exhibit 2-2*** shows the specialty training intentions of medical school graduates from 1988 to 1999. The percentage of all medical school graduates planning careers in the generalist specialties (general internal medicine, general pediatrics, and family practice) increased from a low of 15 percent in 1991 to a peak of 40 percent in 1997 then decreased to 36 percent in 1999. Over this same period, the percentage planning careers in the medical specialties[2] increased from 28 percent in 1988 to a

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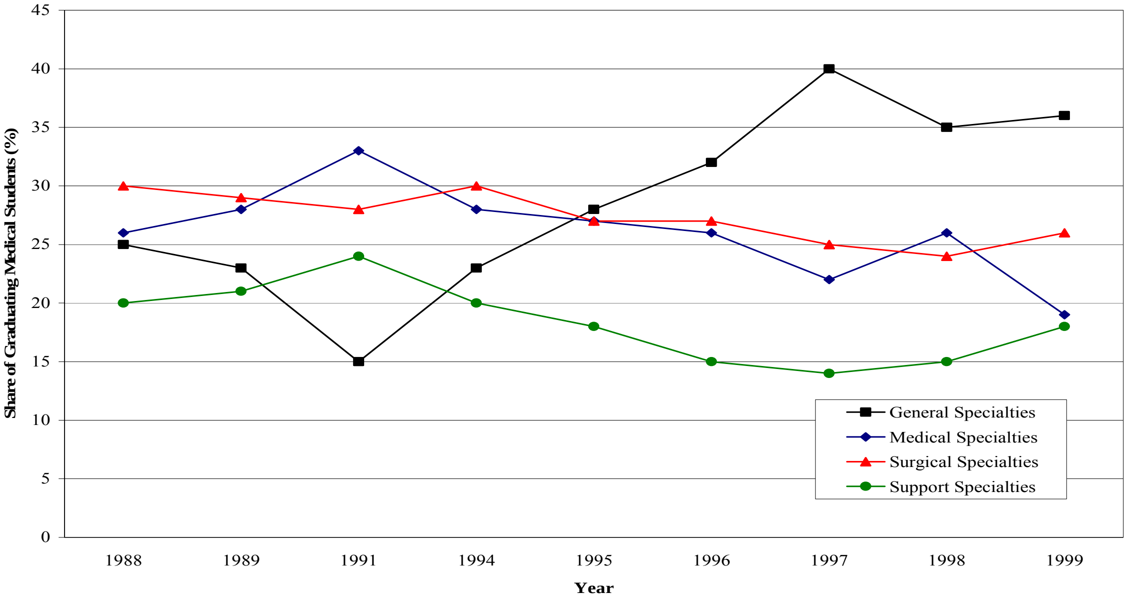
[2] Medical specialties include family practice subspecialties, internal medicine subspecialties, pediatric subspecialties, psychiatry and neurology and their subspecialties, allergy and immunology and subspecialties, preventive medicine and its related specialties, and dermatology and its subspecialties.

high of 33 percent in 1991, and then decreased to 19 percent in 1999. Similarly, the percentage planning to enter the surgical specialties[3] and the support specialties[4] showed similar decreases from 1988 to 1999, although interest in support specialties grew after 1997.

Exhibit 2-2
Specialty plans of graduates



SOURCE: Association of American Medical Colleges. AAMC Data Book: Statistical Information Related to Medical Schools and Teaching Hospitals 2000. Washington, DC

All Residents

Exhibit 2-3 shows the trends in the actual distribution of all resident physicians among the four specialty groups. From 1995-2003, the proportion of all residents training in generalist specialties increased slightly from 38.4 percent to 39.9 percent. Over the same period, the percentage of residents training in surgical and support specialties decreased slightly, while medical specialty residents increased their share resident share.

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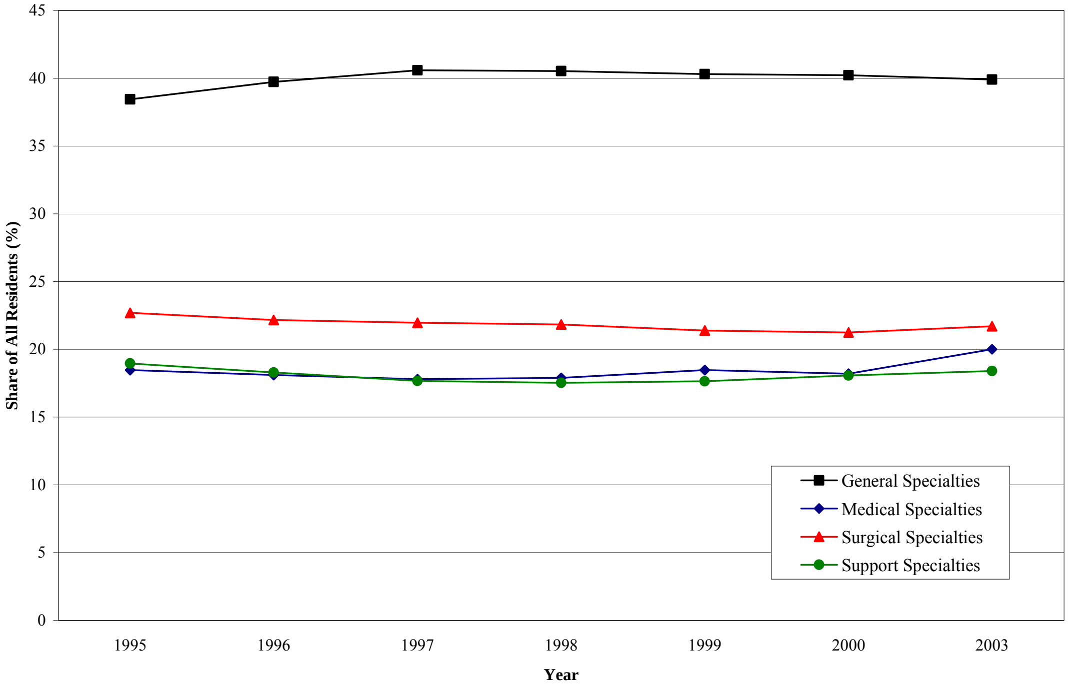
[3] Surgical specialties include general surgery and its subspecialties, colon and rectal surgery, neurological surgery obstetrics and gynecology and subspecialties, ophthalmology, orthopedic surgery otolaryngology, plastic surgery, thoracic surgery, and urology.

[4] Support specialties include anesthesiology and its critical subspecialty, emergency medicine, nuclear medicine, pathology and its subspecialties, physical medicine and rehabilitation, and radiology and related subspecialties.

Exhibit 2-3
Trends in specialty distribution of residents, 1995-2003

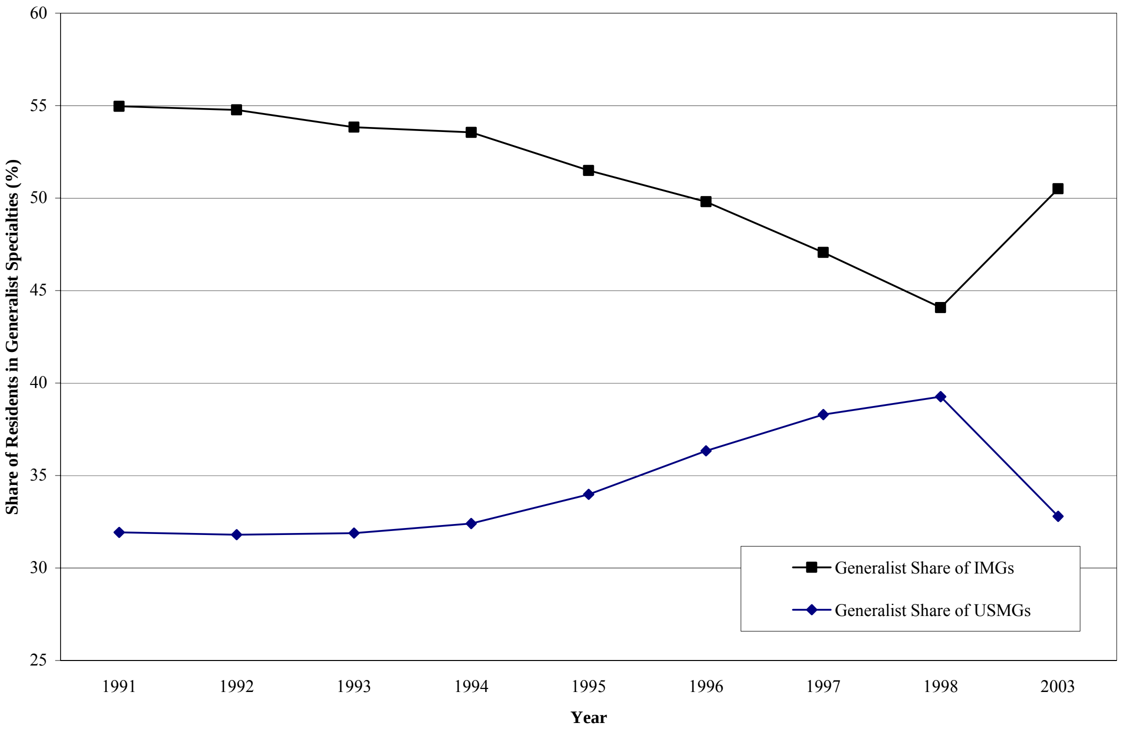


SOURCE: *JAMA* Medical Education issues, 1995-2001; year 2003 from www.jama.com, June 16, 2005.

USMGs and IMGs

The growth in the number of resident physicians in generalist training may have reflected the specialty preferences of IMGs, who for many years chose generalist specialties at significantly higher rates than graduates of medical schools in the U.S. (USMGs). However, in the 1990s, the career choices of USMGs and IMGs started converging (***Exhibit 2-4***). From 1991 to 1998, the fraction of USMGs in generalist training increased from 31.9 percent to 39.4 percent, while the fraction of IMGs in generalist training decreased from 54.9 percent to 44.8 percent. This increasing trend in USMGs entering the generalist specialties may have reflected widespread beliefs among USMGs those employment opportunities were greater in the generalist specialties, or that U.S. medical schools had become more effective than international medical schools at enticing students to enter primary care. A radical reversal occurred after 1998 in the IMG-USMG preferences for general medicine. This is likely due to a switch in USMG preference for specialization with IMGs filling “empty” generalist resident slots.

Exhibit 2-4
Trends in generalist specialties by IMG status, 1991-2003



SOURCE: *JAMA* Medical Education Issues, 1992-2001; year 2003 from www.jama.com, June 16, 2005.

Gender and Specialty

Table 2-6 shows the trends in distribution of male and female residents among the four specialty groupings. First, from 1995 to 2000, both the absolute number and the percentage of females in generalist training have increased. This finding, coupled with the rapid influx of females into residency programs, likely explains the slight increase in the percentage of all residents in the generalist specialties (see Exhibit 2-3). Second, the number and the percentage of females in the support specialties decreased 2.5 percentage points over the same period. There was little change in their participation in the other specialties. The absolute number of males entering each of the specialties decreased slightly from 1995-2000. However, with the exception of surgical specialties, which have declined, the share of males in each of the specialty categories showed little change over the study period.

Table 2-6
Trends in specialty by gender, 1995-2000

Counts of Resident in Each Specialty

	Females				Males			
Year	Generalists	Medical Specialists	Surgical Specialists	Support Specialists	Generalists	Medical Specialists	Surgical Specialists	Support Specialists
1995	15,409	6,194	5,543	5,548	22,277	11,913	16,701	13,041
1996	16,447	5,972	5,680	5,223	22,094	11,008	15,824	12,177
1997	17,603	6,167	5,873	5,239	22,108	11,189	15,652	12,008
1998	17,945	6,312	5,963	5,187	21,490	11,084	15,297	11,856
1999	18,344	6,789	6,032	5,271	21,141	11,309	14,920	12,015
2000	18,137	6,718	6,150	5,297	20,792	10,897	14,422	12,202

Share of Residents in Each Specialty, by Gender

	Females				Males			
Year	Generalists	Medical Specialists	Surgical Specialists	Support Specialists	Generalists	Medical Specialists	Surgical Specialists	Support Specialists
1995	46.3%	18.6%	16.6%	16.7%	34.4%	18.4%	26.1%	20.1%
1996	48.4	17.6	16.7	15.4	35.6	17.7	25.9	19.6
1997	49.3	17.3	16.4	14.7	35.6	18.0	25.7	19.4
1998	49.4	17.4	16.4	14.3	35.3	18.2	25.6	19.5
1999	49.1	18.2	16.1	14.1	34.9	18.7	25.1	19.8
2000	48.7	18.0	16.5	14.2	34.9	18.3	24.7	20.5

SOURCE: Data from *JAMA* Medical Education Issues 1996-2001.

Race/Ethnicity by Specialty

Table 2-7 shows the trends in the specialty preferences of URMs and Non-URMs. As mentioned above, URMs are those who self-identified as Black or Hispanic (Mexican American, Puerto Rican, or other Hispanic), and Non-URMs include residents self-identified as white non-Hispanic or Asian/Pacific islander. From 1995 to 2000, the percentages, as well as the absolute numbers, of both URM and non-URM residents in generalist training increased. During this period, the percentage of all URMs who were training in the medical specialties decreased from 20.6 percent to 16.9 percent while the proportion of all non-URMs training in the medical specialties remained unchanged.

Table 2-7
Trends in ethnicity by specialty, 1995-2000

Counts of Residents in Each Specialty

	Under-Represented Minorities				Non-Under-Represented Minorities			
Year	Generalists	Medical Specialists	Surgical Specialists	Support Specialists	Generalists	Medical Specialists	Surgical Specialists	Support Specialists
1995	4,127	2,076	2,085	1,649	30,353	14,883	18,873	15,720
1996	4,242	1,959	2,106	1,534	29,578	12,855	17,869	14,103
1997	4,405	1,820	2,057	1,452	29,795	12,196	17,416	13,493
1998	4,573	1,778	2,081	1,520	29,220	12,225	16,851	13,281
1999	4,789	1,814	2,116	1,498	29,193	12,796	16,307	13,342
2000	4,952	1,880	2,354	1,666	31,960	14,502	16,726	14,493

Share of Residents in Each Specialty, by URM Status

	Under-Represented Minorities				Non-Under-Represented Minorities			
Year	Generalists	Medical Specialists	Surgical Specialists	Support Specialists	Generalists	Medical Specialists	Surgical Specialists	Support Specialists
1995	40.9%	20.6%	20.7%	16.4%	37.5%	18.4%	23.6%	19.7%
1996	42.4	19.6	21.1	15.3	39.1	17.0	24.0	19.0
1997	44.4	18.4	20.7	14.6	40.0	16.4	23.9	18.5
1998	44.9	17.5	20.4	14.9	39.9	16.7	23.5	18.6
1999	45.8	17.4	20.3	14.3	39.8	17.4	22.8	18.6
2000	44.5	16.9	21.2	15.0	40.2	18.3	21.5	18.7

NOTES:

URMs are defined as residents identified as Black or Hispanic (Mexican American, Puerto Rican and other Hispanic)

Non-URMs include residents identified as white non-Hispanic and Asian/Pacific Islander.

Percentages computed by dividing number in cell on top of table by the total number of URM or Non-URM provided by RTI International using the definitions above.

SOURCE: Data from *JAMA* Medical Education Issues 1996-2001.

2.5 Trends in Approved Programs and Sponsors

This section highlights recent changes in the underlying structure of the U.S. GME enterprise by examining trends in the number of approved residency programs, the number of new program sponsors, and the number of clinical sites. In addition, this section examines the trends in the governance of programs and the specialty distribution of programs over time.

2.5.1 Trends in the Numbers of Approved Programs and Program Sponsors

As shown in ***Table 2-8***, the total number of accredited residency programs has increased every year from 7,657 in 1995 to 8,192 in 2003, representing a net increase of 535 residency programs over the study period. This increase in the number of accredited programs is somewhat surprising since one would have expected that hospital closures and mergers would have resulted in a decrease in the number of residency programs.

Table 2-8
Trends in program characteristics, 1995-2003

Year	Total ACGME Accredited Programs[a]	Total Program Sponsors[b]
1995	7,657	805
1996	7,791	788
1997	7,861	812
1998	7,892	811
1999	7,948	808
2000	7,985	873
2003	8,192	726

NOTES:

[a] An accredited program is a residency program that is accredited by the Accreditation Council on Graduate Medical Education.

[b] An sponsoring institution is the entity that assumes the final responsibility for a GME program. Most GME programs are undertaken by a specific clinical department within a hospital or other health care organization; a hospital, medical school or educational consortiums usually the sponsoring organization.

SOURCE: Data from *JAMA* Medical Education Issues 1996-2001; year 2003 from www.jama.com, June 16, 2005.

Not surprisingly, as the number of accredited programs has increased, so has the number of organizations sponsoring GME programs — at least through 2000. Program sponsors are defined as the entities that assume the final responsibility for the structure, quality, and conduct of GME programs. Most GME programs are sponsored by specific medical schools, hospitals, consortia, specific sub-units of hospitals, or medical schools. Since 2000, the number of program sponsors has decreased from 805 to 726. The greatest increase occurred between 1999 and 2000 followed by substantial decline over the next three years. Unfortunately, there is little comprehensive data that may be used to explain the large swings in sponsorship between these study years.

From 1995 to 2000, with the number of programs rising, it seems unlikely that the number of sponsoring institutions would fall. Also, for some specialty programs, a medical school, or a newly created educational consortium, may be the sponsoring institution, especially if the specialty program involves rotations at several hospitals. As a result, creating the new specialty program may also create a new sponsoring organization.

Although there were a number of hospital mergers or networks created during this period, it is unlikely that the number of sponsoring institutions would be much affected, because merger partners may have likely been in some educational consortium prior to the merger. Furthermore, if a medical school were the sponsoring institution, then the hospital merger would have no effect on the number of sponsoring institutions.

2.5.2 Trends in Program Governance

Table 2-9 shows the trends in the total number of organizations involved in GME by organizational ownership status/governance. From 1995 to 2000, the number of federal government organizations either sponsoring or participating in a GME program decreased from 155 to 148 before returning to the 1995 level in 2003. A similar trend was observed for public non-federal and for private organizations. Overall, the total number of organizations involved in GME has increased by 182 from 1995 to 2003 and by 147 in the post-BBA period.

2.5.3 Trends in the Specialty Distribution of Programs

Table 2-10 shows trends in the number of accredited residency programs by specialty groupings. As mentioned above, from 1995 to 2003, 535 new residency programs were created (see Table 2-8). This increase was entirely the result of new residency programs started in the medical specialties. Over this period there was a slight decrease in the number of new programs in generalist, surgical, and support specialty programs.

The bottom row of Table 2-10 reports the changes in the number of approved residency programs by specialty grouping following the passage of the BBA. From 1997 to 2003, the total number of approved generalist and support programs decreased while the number of approved surgical and medical specialty programs increased.

2.6 Trends in Residents and Programs by Region and State

This section reports the results of analyses that examine geographic differences in the GME enterprise. In addition, because of the dominant role of the state of New York in the GME enterprise, we present data on changes in the New York GME enterprise as well.

Table 2-9
Trends in the total number of participating and sponsoring organizations and primary clinical sites involved in graduate medical education by ownership/governance, 1995-2003

Year	Public Federal[a]	Public Nonfederal[b]	Private[c]	Total
1995	155	410	1,126	1,691
1996	153	405	1,129	1,687
1997	158	415	1,153	1,726
1998	150	410	1,157	1,717
1999	143	383	1,188	1,714
2000	148	385	1,122	1,655
2003	154	444	1,275	1,873

NOTES:

[a] Public Federal includes programs sponsoring or participating by the Army, Navy Other Military, Public Health Service, VA and Other federal.

[b] Public Non-federal includes programs sponsoring or participating by the State, county, city, city and county, and hospital district authority.

[c] Private— Includes programs sponsoring or participating by the church, other non-profit, individual, partnership or corporation.

SOURCE: Data from *JAMA* Medical Education Issues 1996-2001; year 2003 from www.jama.com, June 16, 2005.

Table 2-10
Trends in specialty type of program, 1995-2003

Year	Total Number of Generalist Programs	Total Number of Medical Specialties Programs[a]	Total Number of Surgical Specialties Programs[b]	Total Number of Support Specialty Programs[c]
1995	1,086	2,878	1,755	1,740
1996	1,107	2,960	1,749	1,762
1997	1,120	2,954	1,742	1,806
1998	1,121	2,999	1,736	1,794
1999	1,113	3,078	1,707	1,819
2000	1,104	3,096	1,720	1838
2003	1,067	3,410	1,753	1,712
Change, 1995-2003	-19	+532	-2	-28
Change, 1997-2003 (Post-BBA)	-53	+456	+11	-94

NOTES:

[a] Medical specialties include family practice subspecialties, internal medicine subspecialties, pediatric subspecialties, psychiatry and neurology and their subspecialties, allergy and immunology and subspecialties, preventive medicine and its related specialties and dermatology and its subspecialties.

[b] Surgical specialties include general surgery and its subspecialties, colon and rectal surgery, neurological surgery obstetrics and gynecology and subspecialties, ophthalmology, orthopedic surgery otolaryngology, plastic surgery, thoracic surgery and urology.

[c] Support specialties include anesthesiology and its critical subspecialty, emergency medicine, nuclear medicine, pathology and its subspecialties, physical medicine and rehabilitation, and radiology and related subspecialties.

SOURCE: Data from *JAMA* Medical Education Issues 1996-2001; year 2003 from www.jama.com, June 16, 2005.

2.6.1 Graduate Medical Education by Region

Table 2-11 ranks the various regions of the United States in terms of the size of the GME enterprise. Clearly, the dominant region in terms of the number of residents trained is the Middle Atlantic region (New York, New Jersey and Pennsylvania) which, in 2003, trained almost one quarter of all the resident physicians in the United States. The second most GME-intensive region is the East North Central Region (Illinois, Indiana, Michigan, Ohio and Wisconsin). In 2003, this region trained 17.0 percent of residents. The remaining regions in decreasing order of GME intensity are the South Atlantic region (15.0 percent of all residents), the Pacific region (11.5 percent), the West South Central region (9.3 percent), the New England region

(8.1 percent), the West North Central region (6.4 percent), the East South Central region (4.3 percent), and the Mountain region (3.5 percent).

Table 2-11
Resident physicians on duty as of August 1, 2003, by region

Region	Total number of resident physicians	Share of all residents (%)	Residents per 100,000
Middle Atlantic	24,103	24.1%	60
East North Central	16,944	17.0	37
South Atlantic	14,987	15.0	28
Pacific	11,536	11.5	25
West South Central	9,323	9.3	28
New England	8,113	8.1	57
West North Central	6,434	6.4	33
East South Central	4,322	4.3	25
Mountain	3,491	3.5	18

NOTES:

New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont

Middle Atlantic: New Jersey, New York, and Pennsylvania

East North Central: Illinois, Indiana, Michigan, Ohio, and Wisconsin

West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota

South Atlantic: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia

East South Central: Alabama, Kentucky, Mississippi, and Tennessee

West South Central: Arkansas, Louisiana, Oklahoma, and Texas

Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming

Pacific: Alaska, California, Hawaii, Oregon, and Washington

SOURCE: Data from www.jama.com, June 16, 2005.

As expected, the Middle Atlantic and East North Central regions have the highest ratio of residents to population, reflecting the presence of large teaching hospitals and medical schools located in densely populated urban areas on the east coast of the United States.

Table 2-12 shows the change in the number of residents in each region from 1997 to 2003. The areas that experienced an increase in the number of residents since 1997 are the New

England, the South Atlantic, the West South Central, Pacific, Mountain, and Mid-Atlantic Census regions. However, the North Central regions experienced decreases from 1997.

Table 2-12
Change in the number of residents on duty by region, 1997 to August 2003

Region	Change in Total Resident Physicians	Percent Change
Mountain	+281	8.8%
New England	+630	8.4
Pacific	+581	5.3
West South Central	+303	3.4
South Atlantic	+250	1.7
Middle Atlantic	+271	1.1
East South Central	-1	0.0
East North Central	-263	-1.5
West North Central	-114	-1.7

NOTES:

New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont

Middle Atlantic: New Jersey, New York, and Pennsylvania

East North Central: Illinois, Indiana, Michigan, Ohio, and Wisconsin

West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota

South Atlantic: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia

East South Central: Alabama, Kentucky, Mississippi, and Tennessee

West South Central: Arkansas, Louisiana, Oklahoma, and Texas

Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming

Pacific: Alaska, California, Hawaii, Oregon, and Washington

SOURCE: Data from *JAMA* Medical Education Issues 1998 and www.jama.com, June 16, 2005.

There are, at least, three possible explanations for these observed changes in regional GME enterprise. First, it is possible that the regional differences in various aspects of health care markets (*e.g.*, the number of uninsured individuals, hospital closures, hospital mergers, or the role of ambulatory health centers in providing indigent care) may have led to increases in the number of resident physicians and programs in some regions and decreases in others.

Second, recent trends in the movement of the U.S. population from the Middle Atlantic region to the South and Southwest (*e.g.*, Florida, Louisiana, North Carolina, and Texas) may be partially responsible for increases in the size of residency programs in those states. In other words, as the overall population increases, hospitals could increase the number of resident physicians training in an area as an alternative to recruiting fully trained, practicing physicians to address the increased health care needs arising as a result of an increased population.

Third, differences in the demographics of regions of the country may also explain these regional changes in GME enterprise. For example, it is well known that certain areas in the South and Southwest are popular among older Americans. Furthermore, it is known that increased age is associated with increased use of health care services. Thus, as the average age of a region grows, its demand for health care services will grow as well. As a result, it is not surprising that certain locations (such as Florida) have experienced increased GME intensity in order to meet the increased demand.

These three phenomena may occur simultaneously and could exacerbate the trends noted above. For example, areas that experienced increases in the numbers of poor and underserved, low levels of Medicaid support, an aging population, and rapid population growth are expected to have particularly high increases in GME intensity. Additional research should address these potential explanations for the regional trends in GME intensity noted above.

2.6.2 Graduate Medical Education by State

Table 2-13 reports the changes in the total number of residents by state from 1995 to 2000. Since 1995, 24 states experienced declines in the number of resident physicians. The state of New York showed the largest decrease (610 residents), followed by Maryland (down 281 residents), Ohio (down 157 residents), Minnesota (down 147 residents), Iowa (down 147 residents), and Colorado (down 134 residents). Over this same period, 23 states increased the total number of residents. The five states with the largest increases in the numbers of residents were Massachusetts (186 residents), followed by Florida (175 residents), Virginia (159 residents), North Carolina (103 residents), and Texas (98 residents).

Table 2-13 also shows the changes in the number of residency programs from 1995 to 2000 by state. Over this period only eight states saw decreased numbers of accredited programs (Colorado, Maryland, Kansas, Michigan, New Jersey, Indiana, South Dakota, and West Virginia). However, these eight states accounted for a total of 23 net program closures. Over the same period, 37 states experienced a net increase of 354 new residency programs.

2.6.3 Graduate Medical Education in New York

As mentioned above, the Middle Atlantic Region (New York, Pennsylvania, and New Jersey) trains about one-quarter of all resident physicians. This large share of the national GME enterprise is concentrated primarily in New York State. ***Table 2-14*** shows the trends in the numbers of resident physicians and ACGME-accredited residency programs in New York from 1995-2003. Over this period, the number of programs in New York increased by 8.

Table 2-13
Trends in the total number of residents and residency programs by state

State	Number of Residents in 2000	Change in Number of Residents from 1995 to 2000	Number of Programs in 2000	Change in Number of Programs from 1995 to 2000
Alabama	1,047	-41	95	9
Alaska	24	24	1	1
Arizona	1,055	30	80	3
Arkansas	594	39	55	3
California	8,661	-17	683	31
Colorado	991	-134	82	-5
Connecticut	1,739	32	157	9
Delaware	204	12	14	2
District of Columbia	1,769	76	183	3
Florida	2,792	175	241	29
Georgia	1,787	2	145	12
Hawaii	429	-5	33	3
Idaho	39	-1	4	1
Illinois	5,323	-92	411	21
Indiana	1,254	31	92	-1
Iowa	705	-147	71	1
Kansas	594	-84	50	-4
Kentucky	872	-89	92	6
Louisiana	1,723	88	154	12
Maine	252	18	19	1
Maryland	2,164	-281	186	-5
Massachusetts	4,531	186	350	19
Michigan	4,012	-80	315	-4
Minnesota	1,906	-157	146	6
Mississippi	461	1	37	1
Missouri	2,242	-92	202	12
Montana	20	0	2	0
Nebraska	528	1	45	2
Nevada	158	22	8	1
New Hampshire	302	76	34	3
New Jersey	2,479	-28	174	-2
New Mexico	435	0	45	0
New York	14,327	-610	1,107	32
North Carolina	2,472	103	217	18
North Dakota	110	-8	8	0
Ohio	4,511	-252	387	10
Oklahoma	629	-60	60	0
Oregon	637	34	56	5
Pennsylvania	6,490	-95	531	8

(continued)

Table 2-13 (continued)
Trends in the total number of residents and residency programs by state

State	Number of Residents in 2000	Change in Number of Residents from 1995 to 2000	Number of Programs in 2000	Change in Number of Programs from 1995 to 2000
Rhode Island	687	21	55	5
South Carolina	930	-21	77	2
South Dakota	89	13	7	-1
Tennessee	1,803	21	158	9
Texas	6,130	98	471	33
Utah	566	0	56	0
Vermont	224	-2	27	3
Virginia	1,922	159	174	20
Washington	1,450	-10	109	9
West Virginia	564	-15	58	-1
Wisconsin	1,445	-96	146	9
Wyoming	39	0	2	0

SOURCE: Data from *JAMA* Medical Education Issues 1996-2001.

Table 2-14
Trends in the number and U.S. share of residents and programs in New York, 1995-2003

	New York Programs		New York Residents	
Year	Total	Share of U.S. Total	Total	Share of U.S. Total
1995	1,075	14.0%	14,937	15.2%
1996	1,103	14.2	14,680	15.0
1997	1,110	14.1	14,841	15.1
1998	1,113	14.1	14,445	14.8
1999	1,116	14.0	14,511	14.8
2000	1,107	13.9	14,327	14.8
2003	1,083	13.2	15,019	15.0

SOURCE: Data from *JAMA* Medical Education Issues 1996-2001; year 2003 from www.jama.com, June 16, 2005.

In terms of the number of residents, New York was training 82 more residents in 2003 than it was in 1995. Note that the actual number of New York residents declined by about 600 over the early BBA years before rebounding since 2000.

2.7 Key Findings and Policy Implications

Key findings regarding GME Enterprise include:

Exhibit 2-5
Key findings on trends in GME Enterprise

Changes In	Findings
Size of Enterprise	1. Residents increased 2.6-fold between 1960-2003 2. IMG share lowest in 1990 (18%), then rose to 26% by mid-1990s 3. Medical schools increased 50% between 1960-1999
Characteristics of Residents	4. Female residents doubled between 1985-2003; now 41% of all residents 5. Blacks and Hispanics are 12% of residents in 2003 (10% in 1995) 6. Asians are one-quarter of all residents (6.7 times their proportion of U.S. population) 7. Whites have fallen as percent of residents 8. 40% of residents are in general medicine in 2003; nearly equal percentages (20% each) in medical or surgical specialties 9. Shares of USMGs and IMGs in general medicine converged in 1990s before widening after 1998 (50% vs. 33%, respectively, in general medicine in 2003)
Location of Residents	10. One-quarter of all residents are trained in mid-Atlantic region 11. New York trains 15% of all residents 12. Mountain and New England had largest percent growth in residents post-BBA 13. North Central region lost residents post-BBA
Post-BBA Enterprise	14. Residents increased 1.8% between 1997-2003 15. Residency programs grew 4.2% post-BBA 16. Program sponsors shrank after year 2000 17. Only medical specialties programs grew in number between 1995-2003 (18% increase)

Based on the data presented above, we provide several potential policy implications of the changes in the size, in changes in the specialty characteristics, in the concentration of residents in the Mid-Atlantic region, and concerning overall post-BBA changes in the GME enterprise. It is important to note that these policy implications are intended to stimulate discussion regarding various aspects of the GME enterprise rather than suggest actual policies or specific policy changes.

2.7.1 Size of the GME Enterprise

The policy implication of more residents post-BBA depends in large part on an individual's or organization's beliefs about the future needs of the physician workforce. If it is believed that the total number of physicians being trained is excessive, it is clear that the current trend in the number of residents will result in a slow increase in the number of practicing physicians in the future. On the other hand, if one believes that the number of physicians should decline, approaches to achieving this goal include closing new residency programs, reducing the size of existing programs, or reducing the number of IMGs trained.

2.7.2 Changes in the Specialty Mix of GME Enterprise

Since 1995, the number of residents in the generalist specialties increased then declined slightly. This finding reflects the belief, common in the late 1990s and early 2000, that the number of generalist physicians was inadequate to meet future needs. If the current trend in the number of residents in generalist training continues, additional policies may not be needed to increase the future supply of generalist physicians. Furthermore, since females and URMs have been entering the generalist specialties at an increased rate, any changes in the gender and race/ethnicity mix have an indirect impact on the specialty mix of the GME enterprise. Since 2000, USMGs have opted more often for specialization, implying greater opportunities to specialize more recently.

2.7.3 Concentration of GME in the Mid-Atlantic Region

As described above, in 2000 the Mid-Atlantic region (New York, New Jersey, and Pennsylvania) trained 24 percent of all U.S. resident physicians. This vesting of a major portion of the GME enterprise in the Northeast has several policy implications. First, the poor benefit since resident physicians may serve as the primary health care providers to the poor and underserved in several large cities in the Northeast, including New York City, Newark, and Philadelphia. It is likely that reducing the number of residents trained in these cities would limit access to health care for the poor and underserved.

Second, the concentration of residents in fewer large programs may have a positive impact on the quality of the training. Preliminary unpublished research by the Commonwealth Fund Task Force on Academic Health Centers (AAMC, 2002) found that among internal medicine programs, those that enrolled more than 100 residents had significantly higher rates of passing on the American Board of Internal Medicine certification examination compared to smaller programs. However, it is important to note that these findings are considered exploratory, since the analysis could not control for some potentially confounding variables.

2.7.4 Changes in the GME Enterprise in the Post-BBA Period

In 1997, provisions in the BBA mandated limits in the growth of GME and provided incentives for voluntary reductions in the number of physicians in training. In addition, the BBA included a voluntary resident reduction program that was modeled after the New York Medicare Graduate Medical Education Payment Demonstration. The data presented in this report show that, immediately following the BBA, the total number of resident physicians nationally decreased, and the total number of resident physicians in New York decreased very slightly. Given that the Medicare program is the single largest direct supporter of the GME enterprise, legislated reductions Medicare GME payments may have depressed resident demand. However, strong resident growth after 2000 suggests little lasting financial impact on hospital demand for residents.

SECTION 3
GENERAL MODEL OF THE HOSPITAL DEMAND FOR RESIDENTS

3.1 Introduction

In this section of the report, we present a general model of the teaching hospital's demand for residents. The model will show the causal factors we believe drive the growth in residents in U.S. hospitals. It is then used as a framework to guide the evaluation research in the sections that follow. The model hypothesizes behavioral responses to changes in federal GME payments as well as to incentives embedded in the New York Voluntary Resident Reduction Demonstration. Of particular concern for our evaluation are threats to validity resulting from the changing environment nationally and in New York. Factors that could cause hospitals to reduce their residents and/or affect quality and access to care need to be isolated from BBA and demonstration effects. Interview protocols used to interview hospital managers and clinicians also were based on the model.

A general description of the model is presented in this section. A more detailed model is available in ***Appendix 3.A*** for the interested reader.

3.2 Overview of Model Structure

Because very few teaching hospitals are proprietary organizations,[5] we assume that decision makers in the typical teaching hospital, instead of maximizing profits, seek to maximize two goals: (1) services (mainly discharges) to the community; and (2) the number of residents. The hospital's "mission" is to increase admissions/discharges in order to meet community needs.[6] As both goals involve costly resources, decision makers may have to trade off community service, if at all, with the size of their teaching program, as proxied by the number of resident. Hospitals are also interested in producing high quality care, but for simplicity we include quality in the demand for the hospital's services. Higher resident counts may also proxy higher quality depending on other factors.

The teaching hospital is constrained in achieving its dual goals by having to "break even" on its total margins—at least in the long run. Operating, or patient, margins may be negative but should be no less than nonoperating revenues, which are mostly donations, government subsidies, or other non-patient activities. It is generally known that teaching hospitals often run losses on patient care and subsidize them through non-operating revenues. When operating losses become too large, however, hospital management must reduce costs and curtail services or teaching programs to re-establish financial solvency.

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[5] Roughly 13 percent of hospitals with residents are for-profit and the trend may be growing, as shown in Section 9.10.

[6] Discharges are a proxy for a multi-service facility including outpatient services in satellite clinics.

Medicare is an unusual payer in paying explicitly for residents. (Medicaid in some states—and especially in New York—also pays for residents to some extent.) Medicare does so in two ways:

- First, it pays its share of resident salaries and the associated administrative costs of teaching (called Direct Medical Education).
- Second, it pays for higher patient care costs allegedly attributable to residents (Indirect Medical Education).

Of particular interest for the evaluation is the hospital's demand for residents and how it might be affected by Medicare GME payment reductions. Resident demand has both a "derived" component stemming from resident involvement in patient care and a direct component based on the hospital's desire to teach residents. In this sense, residents not only are an input to patient care but also an "output" of the teaching programs.

Hospital decision makers (including managers and physicians) maximize their joint utility by choosing optimal levels of services (i.e., volumes) and residents. Their demand for more residents is a function of the residents' "effective" net wage costs to the hospital compared with the net costs of other inputs such as attending physicians and nursing staff, as well as the volume of services provided in the hospital:

$$D_r = d[W^*_r, W_{md}, W_{rn}, S] \tag{3.1}$$

D_r = the number of residents demanded

W^*_r = the effective net cost (or wage) of residents

W_{md} = the cost of attending physicians to the hospital

W_{rn} = the cost of nurses

S = the volume of hospital services.

Consider, first, the cost of resident. The greater the effective resident wage to the facility, the fewer residents that should be demanded by the institution and vice-versa. The "effective wage" of residents is considerably reduced by three factors: (1) the IME add-on to Medicare per case payment rates; (2) the DME direct wage subsidy; and (3) the direct marginal utility gain to managers and physicians from operating larger resident teaching programs:

$$W_r^* = W_r[1 - DME - IME] - U'_r \tag{3.2}$$

W_r = the actual resident wage (stipend)

DME = the Medicare marginal subsidy effect on resident wages

IME = the IME marginal payment add-on effect of residents

U'_r = the value of the marginal utility gain from more residents.

The bracketed term in (3.2) reflects a combined DME-IME adjustment factor to the nominal resident stipend. It is less than 1.0, implying that hospitals do not bear the full cost of hiring residents.

The hospital will further "discount" the actual wage based on the marginal value that the decision makers place on training residents above and beyond their contribution to hospital output (e.g., Academic Medical Centers).

Attending physicians can be both complements and substitutes for residents. Teaching faculty play a complementary role to the extent that more of their time is required in hospitals with more residents. On the other hand, residents substitute for attendings in caring for patients through task delegation. On net, attendings are generally substitutes for residents, in which case a higher attending "wage" cost shifts up the demand for residents.[7] Other nursing staff and residents are also substitutes to a limited degree with the same positive cross-wage effect on resident demand. (A positive cross-wage effect means that as the real cost of an attending physician rises, so does the demand for residents.)

The last variable affecting resident demand is the volume of services. Larger teaching hospitals with more inpatient days should require more residents or else substitute attendings and other personnel.

Figure 3-1 graphs the hypothetical demand and supply for residents in a teaching hospital. Demand, D_r^1, is downward-sloping as a function of the effective cost of residents in the hospital. The position of the demand curve and its slope depends upon the other input costs, the hospital's service output level, as well as the marginal productivity of residents. A downward slope presumes a declining marginal product of residents in caring for patients as more are hired or when they work longer hours. The supply of residents S_r^1 is assumed to be vertical indicating no relation between the number of residents a hospital can match, or "recruit," and the wage that it pays them. This reflects the fact that resident stipends are set by national rules outside the hospital's control. (Supply depends upon other factors, discussed in a minute.)

If the nominal, non-subsidized, resident stipend was W_r, then Figure 3-1 shows a small excess demand gap in the hospital equal to AB.[8] If the hospital actually had B slots to fill, then its match rate would be A/B. Because of the two Medicare subsidies, however, excess demand for residents is much greater. First, the DME subsidy reduces the effective net wage by a factor, δ, resulting in a larger excess demand gap equal to CD. Second, once the (much larger) IME add-on is accounted for by an adjustment factor, ρ, the resulting $(\delta+\rho)$ adjustment can actually produce a negative effective wage and residents are "more than free" to the hospital.[9] At the

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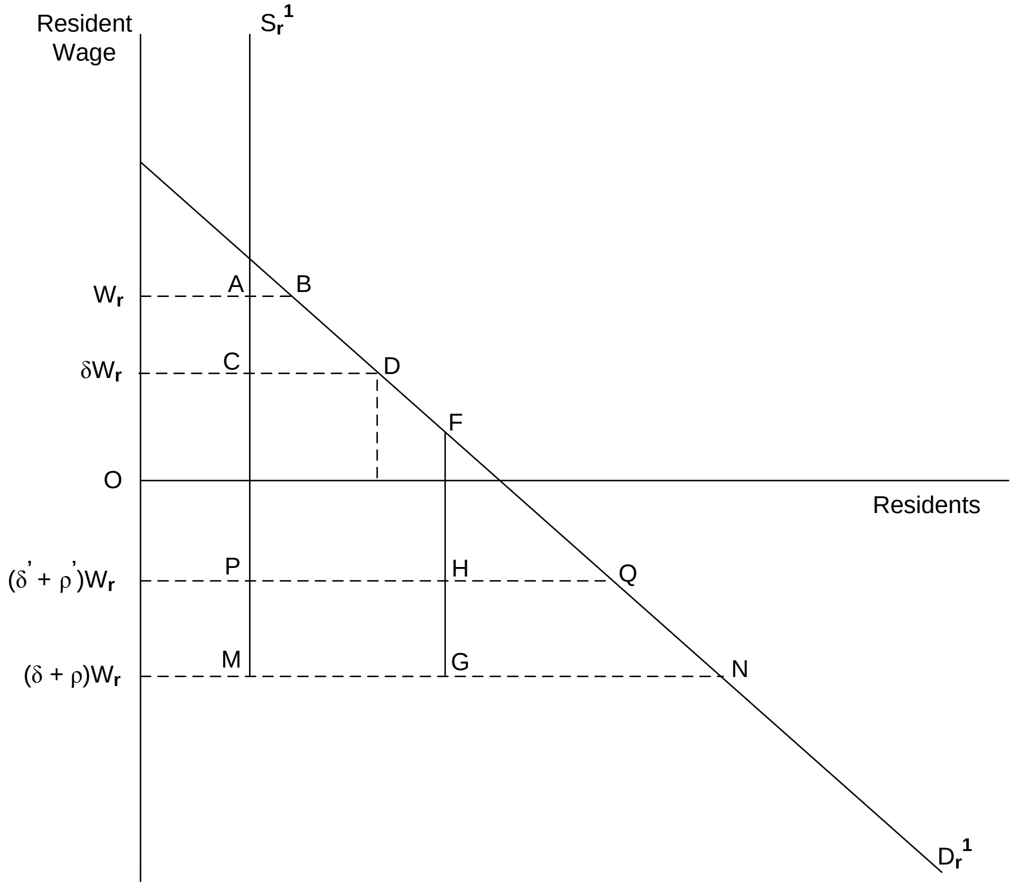
[7] If residents and attendings were complements, on average, then hospitals facing difficulties in recruiting attendings and incurring high real physician costs would have fewer residents. "Safety net" public hospitals with many residents per attending exemplify the substitution relationship.

[8] If the nominal wage was fixed at Wr, this hospital would always have some excess demand for residents even without any Medicare patients or subsidies.

[9] This phenomenon is the reason why some industry observers characterize residents as "a line of business."

Figure 3-1
Hypothetical demand and supply of residents



negative wage (δ+ρ)Wr, residents demanded rises to N and the excess demand gap swells to MN. A negative effective wage makes residents highly desirable to hospitals, to say the least.

Three important facts are important to note about the graph. First, the actual observed number of “supply-bound” residents in the hospital remains A=C=M. Desired demand along schedule D_r^1 is not observed. Second, each downward-sloping resident demand curve is associated with a particular patient volume. This volume, in turn, determines the maximum number of residents in different specialties that the hospital is allowed to have by the Resident Review Committees, or RRCs. Residents must achieve specified surgical and medical patient quotas to meet their training requirements. In Figure 3-1, vertical line FHG reflects the maximum number of residents that the hospital can accommodate with demand D_r^1. Consequently, real excess demand at the subsidized negative wage is the smaller MG instead of MN. Note that if the hospital were filling all of its RRC-allowed slots, total residents equals G with no excess demand. Third, only by chance would the effective, subsidized wage produce an equilibrium of supply and demand; invariably, hospitals will be in disequilibrium (usually dissatisfied) with the level of residents they have. This is because resident wages are determined at the national level and DME and IME subsidies generally encourage “excess demand.” Over time, hospitals should attempt to increase their slots and resident match rate, thereby shifting supply to the right, increasing total residents, and shrinking excess demand.

3.3 BBA and BBRA Impacts

Before we explore the two sources of negative effective wage rates, first consider the impact of the BBA and BBRA legislation. The BBA reduced the IME add-on payment while the BBRA reduced the per resident allowed DME payment for many teaching hospitals.[10] This is graphed as a new, less negative, combined factor, δ' + ρ', that raises the effective wage to the hospital. Still in the negative range for our hypothetical hospital, this new wage shrinks the excess demand gap somewhat to PQ; yet, actual resident counts remain the same (unless the hospital is also able to increase resident supply). This dynamic has direct implications for evaluating the impact of BBA and BBRA payment changes on voluntary (and involuntary) reductions in residents:

- *GME payment reductions should have little or no effect on resident counts in hospitals where the resident's effective net wage remains significantly negative.*
- *Most teaching hospitals will continue to increase their resident counts even at somewhat lower wage subsidies.*

The same conclusion would also apply to any hospital with excess demand for residents, even if it faced a positive net effective wage. However, resident reductions would be more likely in the latter situation, especially if accompanied by a sizable inward shift in the downward sloping demand function (discussed later).

Another implication of the BBA is:

- *Teaching hospitals also facing a "hard" Medicare cap on allowable residents for payment, however, will have to pay the full resident salary for any residents hired beyond the cap, but may still continue to take on first-year residents because they are still cost-effective relative to scarce substitutes.*

3.4 Determining the Marginal DME & IME Wage Effects

Exactly how do the DME and IME subsidies reduce the resident's effective wage facing the hospital? For hospitals not constrained by the Medicare resident cap,[11] the two marginal wage effects are:[12]

$$\text{DME} = \text{PDS}*(1+s) \tag{3.3}$$

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[10] The BBRA actually increased the per resident amount for hospitals less than 70 percent of the average allowed national amount.

[11] While, in theory, most hospitals are currently capped by Medicare, many exceptions and cap adjustments continue to afford teaching hospitals with financial incentives to add residents.

[12] See Section 9.10 and Appendix 9 for derivation.

(3.4) $$\text{IME} = \text{FR}*Q_m*[\text{change in IME\% per resident }] / W_r$$

PDS = Medicare's share of inpatient days

s = the Medicare "cost of teaching" loading factor onto resident's wages

FR = the hospital's case-mix adjusted Federal Rate

Qm = total Medicare PPS discharges.

Absent the BBA cap, the addition of one resident results in additional DME reimbursement of that is a fraction of the resident's wage based on Medicare's share of days and the teaching loading factor. For example, if Medicare days are 40 percent of all inpatient days and the cost of supervising and teaching residents adds 30 percent, then the Medicare DME wage subsidy is [.40 x 1.30 = 52 percent] and the hospital is reimbursed for slightly more than one-half of the resident's wage cost, or stipend.

The addition of one resident also raises the resident-to-bed ratio slightly which increases the IME payment add-on to all Medicare discharges. The IME add-on percentage is

(3.5) $$\text{IME\% add-on} = \text{MF}*[[1+\text{IRB}]^{.405} -1]$$

MF = the Congressionally mandated multiplier factor

IRB = the hospital's intern & resident-to-bed ratio.

At the pre-BBA multiplier of 1.89, the marginal change in the IME percentage add-on for another resident is[13]

(3.6) $$\text{Change in IME\%} = .765[1+\text{IRB}]^{-.595} /\text{Beds}$$

Beds = hospital allowed beds in calculating the IRB. For a teaching hospital with an IRB = .20 and 400 beds, this marginal change is .0017. Although a very small change, the net effect on hospital revenues can be significant. For a teaching hospital with an $8,000 federal rate and 4,000 Medicare discharges, the IME total dollar add-on is $68,635. This amount is greater than the *entire* resident's wage (presumed to be $40,000), and the IME wage-adjustment factor is -$68,635/$40,000 = -1.72. Simulated effects of differing hospital parameters will be explored in Section 9 when analyzing the expected financial losses from the BBA payment reforms.

If residents are generally in excess demand because of low, or even negative, effective wage rates, why would any hospitals voluntarily wish to reduce their resident counts as they did in New York? The answer depends upon both the hospital's particular market situation as well as the ultimate BBA and BBRA payment provisions versus what New York teaching hospitals thought they would be. By coincidence, the New York demonstration began in July, 1997, two

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[13] The change in the IME% add-on in (3.6) is based on the derivative of (3.5).

months before the BBA GME legislation was enacted. Many New York hospitals believed that the BBA teaching rollbacks would be much larger than they actually were. Subsequently, most participants withdrew once Congress set the final payment provisions.

Another reason why a hospital might accept resident reductions has to do with its Medicare dependency. Hospitals with low Medicare volumes will experience only minor DME and IME subsidies and face higher effective resident wage rates with little or no excess demand. Thus,

- *Hospitals with low Medicare dependency should be more sensitive to any reductions in IME and DME payments and be more likely to want to reduce their resident counts post-BBA if patient demand declines.*

This conclusion, of course, depends upon how strong their demand for residents is at various effective wage levels. In particular,

- *If residents serve primarily as substitutes for attending physicians at the hospital because the cost of attracting attendings to the hospital is very high, then resident demand will be shifted outwards thereby creating a larger excess demand situation—possibly even at a positive effective wage.*

This is generally the situation in “safety net” hospitals large uninsured caseloads.

On the other hand, rapidly declining inpatient days and/or discharges could eliminate any excess resident demand, especially when combined with a higher effective wage post-BBA. A downward shift in both inpatient usage and derived resident demand could encourage resident reductions in two ways. First, fewer Medicare discharges would reduce IME payments thereby increasing the resident’s marginal effective wage. (DME payments may not fall if Medicare and non-Medicare days fall uniformly.) Second, the inward shift in resident demand is also accompanied by a leftward shift in the vertical RRC-related constraint, FHG. This would not necessarily eliminate excess demand unless all allowable resident slots were being filled, in which case we would observe a decline in residents with falling patient demand. Thus,

- *Hospitals with large permanent reductions in inpatient volumes over a short time period should be more likely to voluntarily reduce their resident counts because*
  - *fewer patients are being cared for, and*
  - *current residents might have insufficient patients in which to meet their training quotas.*

Most U.S. hospitals went through major inpatient volume reductions in the mid- to late-1980s after Medicare’s DRG per case payment system was implemented. Only recently have New York hospitals experienced major inpatient volume declines.[14] Some New York hospitals

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[14] Between 1994-98, New York hospitals experienced an 18.5% decline in hospital inpatient days while all U.S. non-federal hospitals experienced a +0.9% increase. From 1983-1987, U.S. hospitals experienced a 10.2% decline in inpatient days (AHA *Hospital Statistics*, 2000)

have experienced very large inpatient declines, as we show in Sections 4 and 6, and should be likely candidates for voluntary resident reductions.

Two causes are commonly mentioned by New York hospital management for the large volume declines. First, the New York hospital rate-setting system was sunsetted in the mid-1990s. Hospitals were no longer guaranteed per diem rates but generally had to bill payers on a per discharge basis. Hospitals responded by rapidly shortening inpatient stays.[15] Also with the demise of rate setting came growth in public and private managed care that put further downward pressure on inpatient utilization.

Besides the economic factors that affect resident demand through the resident effective wage, the one other crucial factor that differentiates among teaching hospitals is the utility managers ascribe to running large, diversified, teaching programs.

- *Hospitals that place a high value on "teaching" residents, as distinct from residents' clinical and financial contributions, should be less likely to voluntarily reduce resident counts.*

By contrast,

- *Hospitals that employ residents primarily to care for patients, often in place of scarce attending physicians, are more likely to be sensitive to financial and volume changes. It is also possible that these hospitals may have been most affected, financially, by DME and IME payment reforms and volume declines.*

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[15] Between 1994-1998, New York hospitals reduced hospital inpatient lengths of stay by nearly 20% (AHA, Hospital Statistics, 2000; Table 6).

PART II: EVALUATION OF NEW YORK DEMONSTRATION

SECTION 4
CHARACTERISTICS AND MODELS OF PARTICIPANTS, WITHDRAWALS AND NEVER-PARTICIPANTS

4.1 Introduction

Evaluating the success of the Voluntary Resident Reduction Demonstration in New York involves comparisons of participating with non-participating teaching hospitals in the state. Participation, however, was complicated by the unexpectedly large number of initial participants (49) followed by the large number of subsequent withdrawals (42) over a three-year period. This prompted CMS to ask:

- Did any organizations withdraw from the demonstration, and why did they withdraw?

A thorough answer to this question is required for both future policy as well as technical reasons. First, BBA Section 4626 passed by Congress in 1997 established a national voluntary resident reduction program with transition payments that was nearly identical to the New York demonstration. Yet, only two teaching hospitals ever applied. Thus, it is of policy interest whether any voluntary resident reduction program will ever have broad provider participation. Second, on a technical level, a large number of withdrawals in New York raises a "selection bias" issue for the evaluation. If only 7 of 49 participants actually completed the demonstration, then they are almost certainly different from those that either never or only partially participated. From an evaluation design perspective, how should withdrawals be treated, as participants or as non-participating control hospitals? Incomparable study and control hospitals undermine the demonstration's generalizability to other states. For both policy and technical reasons, we devoted substantial resources to describing participants (continuing and withdrawing) and how they differed from never-participants.

In this section we begin by presenting a general model of participation based on extensive hospital interviews. Next, we present a set of descriptive tables that compare hospitals that never participated and those that participated but withdrew with those that continued and completed the demonstration. We then develop and estimate multivariate models of participation.

4.2 Model of Participation and Withdrawal

To better understand why hospitals participated in the demonstration, interviews were conducted with hospital administrative, financial, and clinical management, residency program directors, attendings and other physician staff, residents, and nurses and nursing management. Respondent comments regarding advantages and disadvantages to participation have been organized into five categories:

- **Volume:** expected or actual changes in inpatient or outpatient volume;
- **Staff Substitution:** factors affecting the necessity and cost of replacing lost residents with other staff;

- **Residency Program Characteristics:** program size, quality, or mix of residency programs;
- **Affiliations, Rotations, and Code 405:** changes in medical school program affiliations or hospital rotations plus enhanced enforcement of state Code 405 work hour limitations on residents;
- **GME Payment:** changes in payers' support for GME or in reimbursements generally.

4.2.1 Volume Changes

Three trends in inpatient volumes played important roles in hospitals' decision to participate then, in many cases, withdraw from the demonstration. First, many interviewees noted the volume declines in inpatient services, especially during the mid-1990s leading up to the demonstration. The HHC hospitals in particular noted that volume declines and subsequent closing of about one-third of their beds were dominant factors in deciding to participate in the demonstration. With lower volumes, fewer residents were needed for patient care.

Second, hospitals noted that the threat of managed care was a particular concern because of its outpatient care orientation. Particularly in New York City, a significant number of patients are covered by Medicaid. During the mid-1990s, plans were made to phase-in mandatory Medicaid managed care over several years. As a result, volumes were expected to continue declining. However, the phase-in of mandatory Medicaid managed care proceeded much more slowly than anticipated, resulting in stabilized volumes and a growing list of withdrawals.

Third, increased competition was the result when the New York Prospective Hospital Reimbursement Methodology (NYPHRM) system for non-Medicare payers expired in 1997. Several participants believed that their volume declines were exacerbated because of "poaching" of Medicaid patients by other hospitals that already had withdrawn, or were considering withdrawing. In addition, participation in the demonstration was seen as a hindrance when competing for admitting physicians since resident cuts would send the wrong signal to admitting physicians looking for resident support.

4.2.2 Staff Substitution

With lower volume, fewer residents were needed for patient care. One financial manager even stated that a hospital "should only be in the [demonstration] if you're going to reduce, not if you're going to replace [residents]". Reducing resident counts does lower resident payroll costs. However, hiring substitutes for the residents, such as nurse practitioners or attending hospitalists, will increase payroll costs. The net financial impact will depend on the salaries of the substitutes (relative to those of residents) and on the number (and type) of substitutes hired. Based on reasonable assumptions,[16] dropping ten residents will save $405,000 in lower resident payroll costs, but adding four attendings and seven replacement NPs would cost about $958,000 ($596,000 for attendings and $362,000 for NPs). On net, payroll costs to the hospital would rise by $553,000 for every ten residents cut.

However, some New York hospitals did not need to hire additional substitutes due to substantial volume declines. They also were able to substitute lower cost primary care for specialty residents. Then, for some HHC facilities, lower volumes and renegotiated contracts with academic attendings reinforced one another. Under the new contracts, HHC hospitals were able to increase the number of FTE physicians in the hospital without incurring higher payroll costs. With no new attendings, there is now a payroll cost *savings* of $43,000 (saving $405,000 on ten fewer residents minus $362,000 for seven extra NPs). Even greater savings could be had with volume declines.

4.2.3 Residency Program Characteristics

Four characteristics of residency programs influenced participation. To begin with, one requirement of the demonstration was that the ratio of primary care to specialty residents be maintained (or increased). As a result, there was an incentive to target specialty programs. Program directors also noted that many specialties were facing national oversupply so fewer new physicians needed to be trained. Consequently, specialty-oriented hospitals were initially encouraged to participate. Only later after large program cuts had been made, was there increased difficulty in attracting high quality attendings. The problem was particularly acute in departments where many small residency programs had been eliminated. This led to subsequent withdrawals from the demonstration among specialty-oriented hospitals.

A desire to downsize low-quality programs in danger of losing accreditation was a second reason for deciding to participate. The demonstration was a way to justify reductions that were desired or often already planned prior to the demonstration. However, where large cuts had already been made, the demonstration was not very attractive since the remaining programs were generally more highly prized.

A third factor concerned “rightsizing” programs. A residency program may be “too large” in the sense that the residents are unable to practice their skills on enough patients and meet RRC volume quotas. On the other hand, some programs may be “too small,” so that residents are spending too much time on providing specialized patient care and not enough time on other educational activities, such as attending seminars or conducting research. By participating in the demonstration, some hospitals hoped to reduce the size of oversized programs and eliminate undersized programs.

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[16] Knickman, et al., (1992) and Green and Johnson (1995), using evidence from time studies of internal medicine residents in New York City, find that, to replace one full time equivalent (FTE) resident, 0.4 FTE physician and 0.7 FTE nurse practitioner (NP) or physician assistant (PA) are required. In 1998, the average stipend for a resident in the northeastern U.S. was about $40,500 (Association of American Medical Colleges, 1999). The median income of general internal medicine physicians in the Middle Atlantic Census region 1997 was $149,000 (American Medical Association, 1998), and the average salary for nurse practitioners in the northeastern U.S. in 1997 was about $51,700 (Laccese, 1998).

Finally, although hospitals could have made these resident cuts on their own regardless of whether the demonstration existed, participation in the demonstration may provide necessary discipline to make the cuts rather than relent to pressure from program directors. Program directors were generally unenthusiastic, if not in fact hostile, toward plans to downsize their programs. The demonstration provided management with an external “bonding device” to deflect some of their criticism.

4.2.4 Affiliation Issues

Demonstration rules required that resident FTEs be determined by where, and for how long, residents are working, not which hospital is sponsoring their program. As a result, hospitals had an incentive to maximize out-rotations and minimize in-rotations. Hospitals with many out-rotations often had a problem of residents being sent back from other participating hospitals. This forced sponsoring hospitals to make deeper cuts than originally expected.

Changes in medical school affiliation have also disrupted residency programs. For a few participants, changes in medical school affiliation resulted in a loss of specialty programs and mitigated internal conflicts over which programs to downsize.

New York State’s Code 405 put significant limitations on how many hours residents could work in both a 24-hour period and over a week. Although enacted prior to the demonstration, enforcement was uneven. Only after joining the demonstration did the state undertake spot checks of hospital compliance. These resulted in a full-scale monitoring program to enforce the rules on residents’ work hours. Consequently, some sites withdrew due to the effective decline in their “FTE” resident workforce.

4.2.5 Financial

Three financial factors influenced the participation decision. The goal of this demonstration was to provide hospitals with a financial incentive to reduce resident counts. However, these incentive payments are temporary, since future Medicare reimbursement (per patient) would be lower as a result of the lower resident counts. Early in the demonstration, the hospital’s total Medicare GME payments if it joined the demonstration actually exceeded the payments it would receive if it did not.[17] However, after the demonstration ends, Medicare GME payments are permanently lower if the hospital participates than if it does not since its resident count is also permanently lower. Because the post-demonstration continual loss of GME revenues from downsizing is so large, only an urgent need for short-run transition payments would be enough to encourage participation. In fact, a few financial managers remarked that their hospitals were in the program because of current financial hardship.

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[17] The transition payment percentages during the first and second years of the demonstration were 100 and 95, respectively. In addition, a participant’s base year IME and DME payment was calculated on higher pre-BBA parameters. Together, these two facts resulted in demonstration GME payments rising above non-participation levels.

Second, financial managers of hospitals that withdrew remarked that cuts in IME payments in the Balanced Budget Act of 1997 (BBA) were less severe than anticipated. A few financial managers also noted that, under the BBA, the intern-and-resident-to-bed (IRB) ratio is measured with a one-year lag and resident counts are calculated with a three-year moving average. As a result, by not participating in the demonstration, a hospital could make cuts that are smaller than 20 to 25 percent but still receive two years of "transition payments." Furthermore, subsequent legislation delayed the IME payment reductions that were part of the BBA.

Finally, the financial risk to participation depends on a hospital's Medicare dependency. If a hospital's Medicare share is relatively low, the financial impact of any shortfall in transition payments is minimized. It is also the case that Medicare dependency acts as a positive proxy for financial strength. This is because it is inversely correlated with the share of uninsured and low-paying Medicaid patients. Low initial Medicare volume, combined with a provider's intention to downsize its residency programs in lieu of the demonstration, should have strongly encouraged them, first, to participate, and then remain in the demonstration.

4.3 Changes in Participation Over Time

In this section we describe the pattern and duration of participation and subsequent withdrawal over time and by hospital location.

4.3.1 Description of Data

The analyses performed in this section are based on a variety of sources. Data on hospital location, volume, and payer mix were taken from the New York Institutional Cost Reports (NYICRs) from base years, 1995 to 1997. The NYICRs are similar to the Medicare Cost Reports, but include more detailed information on hospitals' staffing, and volume and revenues by type of payer (*e.g.*, Medicare, Medicaid, HMO, self-pay, etc.). Total resident counts were taken from Medicare Cost Reports from 1996, the demonstration's base year. Program characteristics such as IMG share, residency program size, and counts of residents by specialty were computed from the CMS Intern and Resident Information System (IRIS) database. Counts of RNs and LPNs were also taken from the 1995 NYICRs because they were more reliable than 1996. The American Medical Association Guide to Residency Programs, from 1994 through 1998, were used to find each hospitals' residency program medical school affiliations.

4.3.2 Participation and Withdrawal by Location

Participation by location (New York City, the NYC suburban ring,[18] or upstate New York) is shown in ***Table 4-1***. A majority of the participants were located in New York City (roughly two-thirds of all participants, or three-quarters of participants in the demonstration for

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[18] We define the New York City suburban ring as those counties in the State of New York that are in the New York City Consolidated Metropolitan Statistical Area (CMSA) but not in New York City itself. These counties are Dutchess, Nassau, Putnam, Rockland, Suffolk, and Westchester Counties.

longer than six months). All seven hospitals that completed the demonstration were from New York City (7 of 32). All 17 initial participants in the NYC suburban ring or upstate eventually withdrew. Six upstate Medicare-eligible hospitals, all members of the Buffalo consortium, withdrew in February, 2001, in the middle of Year 4.

Table 4-1
Number of hospitals participating at any time during each demonstration year

	New York area			
Demonstration year	City	Suburban ring	Upstate	Total
1997-1998	31	3	8	42
1998-1999	26	3	14	43
1999-2000	9	1	8	18
2000-2001	9	1	8	18
2001-2002	8	1	0	9
2002-2003	7	0	0	7
Entire demo	**32**	**3**	**14**	**49**

SOURCE: RTI analysis of participation applications and withdrawal notification letters submitted to CMS.

4.3.3 Participation Duration

Table 4-2 presents summary statistics on the length of time hospitals spent in the demonstration, by NYC location and whether they were an academic medical center (AMC) and/or an HHC hospital. All hospitals that withdrew in the demonstration's first six months are considered "never participants" and are excluded. The average time spent in the demonstration for the 37 participating hospitals is 1,077.8 days, or about three years. Academic medical centers participated for less time, on average, than non-AMC hospitals (687 days, or about 2 years, versus 1,151 days, or 3.2 years). After converting each participant's length-in-demonstration to natural logs to account for the skewed distribution, the difference between AMCs and non-AMCs was significant at the 10 percent level. HHC hospitals participated for more time, on average, than non-HHC hospitals (1,588 days, or 4.4 years, versus 919 days, or 2.5 years). This difference (in natural logs) is significant at the 5 percent level. When restricting to those hospitals in the New York City area (New York City and its suburbs), the pattern remains the same, and the differences are even more significant.

4.3.4 Participation by Location and Volume Change

Table 4-3 presents summary information on changes in inpatient days, inpatient discharges, and outpatient visits for the baseline period prior to the demonstration. The top panel presents results for all teaching hospitals in New York State with available data (108). Over the two-year base period, inpatient days fell an average of 12.9 percent and inpatient discharges fell

Table 4-2
Length of time in demonstration by HHC and academic medical center status

	All participants				NYC area participants			
	Number of hospitals	Mean time in demo (days)	Time in demo (Natural logs)		Hospitals	Mean time in demo (days)	Time in demo (Natural logs)	
			Mean	Std. dev.			Mean	Std. dev.
Total	**37**	**1,077.8**	**6.790**	**0.624**	**31**	**1,033.8**	**6.715**	**0.657**
Academic medical centers								
Academic medical centers	6	687.2	6.463*	0.386	5	562.2	6.320**	0.181
Non-academic medical centers	31	1,151.0	6.853	0.646	26	1,121.2	6.694	0.566
HHC hospitals								
HHC hospitals	9	1,588.1	7.236**	0.590	9	1,588.1	7.236***	0.590
Non-HHC hospitals	28	919.4	6.647	0.574	22	817.0	6.501	0.566

NOTES:
* = p<.10; ** = p<.05; *** = p<.01.
All means are unweighted. Non-PPS hospitals and hospitals in the demonstration for less than six months are considered non-participants and are excluded. Two asterisks denote a difference in log (participation time) significant at the 95% confidence level. Participation times for hospitals remaining in the demonstration are calculated through June 30, 2003, the end of the demonstration. This yields a maximum participation time of 2,190 days (7.69 log days), or 6 years, for the continuing participants.

SOURCE: RTI analysis of participation applications and withdrawal notification letters submitted to CMS.

by 3.7 percent, but outpatient visits increased by 21.5 percent for all New York teaching hospitals. Never-participants exhibited much smaller declines in inpatient days than did participants (-10.7 percent versus -17.1 percent). Never-participants' decline in discharges was only slightly smaller, implying that their lengths of stay were falling at almost double the rate of participants. Never-participants experienced a slightly higher rate of increase in outpatient visits (22.8 percent) than did participants (19 percent).

Table 4-3
Volume changes of New York teaching hospitals prior to the demonstration, by demonstration status

		Total Change, 1995-97 (%)		
	Number of hospitals	Inpatient days	Inpatient discharges	Outpatient visits
All observations	**108**	**-12.9**	**-3.7**	**21.5**
Never-participants	70	-10.7	-3.5	22.8
Participants	38	-17.1***	-3.9	19.0
Withdrawals	31	-16.7	-3.1	22.6
Completers	7	-18.8	-7.5	3.4*
New York City	**52**	**-15.2**	**-4.9**	**22.3**
Never-participants	23	-11.5	-5.2	25.9
Participants	29	-18.2**	-4.7	19.5
Withdrawals	22	-17.9	-3.8	24.8
Completers	7	-18.8	-7.5	3.4
Upstate	**31**	**-12.5**	**-3.8**	**28.9**
Never-participants	25	-11.5	-4.0	27.3
Withdrawals	6	-16.5*	-2.8	35.7

NOTES:
* = p<.10; ** = p<.05; *** = p<.01.
All means are unweighted. The sample includes Phase I and Phase II participants and excludes non-PPS hospitals. Hospitals in the demonstration less than six months are considered non-participants.

SOURCE: RTI analyses of New York Institutional Cost Reports.

Volume trends differed in important ways between withdrawals and completer participants. Although the overall decline in inpatient days was similar between the two, discharges fell an average of 3.1 percent among withdrawing hospitals versus 7.5 percent among completer participants--albeit not statistically significant due to the small sample of completers. Conversely, outpatient visits rose 22.6 percent among hospitals that withdrew versus only 3.4 percent among hospitals that completed the demonstration. Thus, not only did length of stay fall for completers (by -11.3 percent), but, unlike the other two groups of hospitals, little of the loss in inpatient activity was shifted to the hospital's outpatient service.

Trends in New York City dominate statewide trends as the two exhibit nearly identical patterns. Upstate hospitals follow a pattern similar to the New York City hospitals with regard to inpatient days, although never-participants experienced larger (not smaller) declines in discharges. The net result is that lengths of stay were falling twice as fast upstate among participants (-13.7 = -16.5 - (-2.8)) than among never-participants (-7.5 = -11.5 - (-4.0)).

Table 4-4 presents 1996 baseline information on New York teaching hospitals' Medicare and Medicaid day shares, their disproportionate share of low-income patients (DSH share),[19] and safety-net hospital status.[20] The Medicare day share is an indicator of the potential financial impact of any changes in Medicare GME payments since payments will be proportional to its number of Medicare days. The Medicaid day share, DSH share, and safety-net hospital status are all indicators of possible financial distress to the extent that they reflect greater proportion of non-paying patients.

Overall, never-participants had higher Medicare, and lower Medicaid, shares than participants. These differences were statistically very significant. Furthermore, those participants that completed the demonstration had 40 percent lower Medicare day shares and double the Medicaid shares of participants that eventually withdrew. This pattern is mirrored among New York City hospitals, but not among upstate hospitals.

Statewide, participants had nearly double the DSH share of never-participants, and remaining participants had nearly double the DSH share that withdrawing participants had (85.7% versus 46.7%). Both differences are statistically significant at the 99 percent confidence level. Similarly, participants were more than twice as likely to be safety-net hospitals and completer participants were more than twice as likely to be safety-net hospitals than were withdrawals (85.7% versus 38.7%).

Table 4-5 presents base year summary information on residency program characteristics by participation status. Statewide, participants and never-participants differ markedly in their ratio of residents to ADC. Participants had nearly double the resident-to-ADC ratio of never-participants, a very statistically significant difference. Resident-to-ADC ratios for withdrawals and completer participants did not differ. In New York City, participants had even higher resident ratios than did never-participants. Conversely, among upstate hospitals, there is little difference in the average resident-to-ADC ratio between the two groups. Although participating

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[19] The DSH share, used in the Medicare Prospective Payment System for acute hospitals, is equal to the sum of (1) the proportion of Medicare Part A patient days accounted for by patients also eligible for SSI benefits, and (2) the proportion of all inpatient days accounted for by patients eligible for Medicaid benefits but not Medicare Part A benefits.

[20] For purposes of the New York Medicare GME Demonstration, a "safety-net hospital" is a hospital that, according to New York State law, has been designated a Major Public Hospital or a Financially Distressed Hospital.

hospitals tended to run much larger resident programs, they did not have any greater percentage of very small programs. This was also true of completer versus withdrawing participants, although upstate participants did show some differences.

Table 4-4
Payer mix and other financial characteristics of New York teaching hospitals by demonstration status

	Number of Hospitals	Share of days		DHS Share	Safety-net hospital
		Medicare	Medicaid		
All Observations	**108**	**43.6**	**23.1**	**37.4**	**30.8**
Never-participants	70	46.8	17.2	28.4	21.7
Participants	38	37.6***	34.0***	53.9***	47.4***
Withdrawals	31	40.6	28.6	46.7	38.7
Completers	7	24.2*	58.2***	85.7***	85.7**
New York City	**52**	**37.2**	**34.5**	**55.0**	**43.1**
Never-participants	23	42.5	27.9	46.4	31.8
Participants	29	33.0**	39.8**	61.5**	51.7
Withdrawals	22	35.8	33.9	53.8	40.8
Completers	7	24.2**	58.2***	85.7***	85.7**
Upstate	**31**	**50.0**	**12.2**	**22.8**	**12.9**
Never-participants	25	49.4	11.8	21.8	12.0
Withdrawals	6	52.5	13.8	27.2	16.7

NOTES:

* = p<.10; ** = p<.05; *** = p<.01.
All means are unweighted. The sample includes Phase I and Phase II participants and excludes non-PPS hospitals. Hospitals in the demonstration less than six months are considered non-participants.

SOURCE: RTI analyses of New York Institutional Cost Report data, 1996.

Table 4-5
Residency program characteristics of New York teaching hospitals by demonstration status

	Number of hospitals	Residents/ 100 ADC	Share of programs with <2 FTE residents	Share of residents in primary care	IMG share
All Observations	**108**	**28.4**	**29.8**	**52.8**	**46.7**
Never-participants	70	21.9	31.0	53.6	39.8
Participants	38	40.4***	27.7	51.5	58.9***
Withdrawals	31	39.8	25.8	45.6	56.2
Completers	7	43.0	35.8	55.2	70.6*
New York City	**52**	**39.3**	**28.9**	**46.1**	**54.4**
Never-participants	23	30.5	31.8	46.6	51.0
Participants	29	46.2***	26.4	45.6	57.2
Withdrawals	22	47.2	23.3	37.5	52.8
Completers	7	43.0	35.8	55.2*	70.6*
Upstate	**31**	**19.2**	**30.3**	**62.5**	**34.8**
Never-participants	25	19.6	26.6	59.5	28.4
Withdrawals	6	17.9	44.2	73.5	58.1**

NOTES:

* = p<.10; ** = p<.05; *** = p<.01.

All means are unweighted. The sample includes Phase I and Phase II participants and excludes non-PPS hospitals. Hospitals in the demonstration less than six months are considered non-participants.

SOURCE: RTI analyses of New York Institutional Cost Reports, 1996; CMS IRIS program data, 1994.

Statewide, participants and never-participants had very similar primary care shares, both slightly over 50 percent. Completer participants, however, had significantly higher primary care shares than withdrawing hospitals in New York City. In general, there is a monotonically increasing relationship between IMG share and extent of participation: never-participants, 39.8 percent; withdrawals, 56.2 percent; completers, 70.6 percent. This pattern of increasing IMG shares with participation persists across geographic areas within the state. Although IMG shares in upstate hospitals tend to be lower than in New York City, IMG shares are, on average, double among participants than among non-participants.

Table 4-6 presents average base year ratios of residents to RNs and LPNs to RNs illustrating nurse substitution for residents. Hospitals participating in the demonstration had higher baseline ratios of residents to RNs, and those hospitals remaining in the demonstration had the highest resident-to-RN ratios (i.e., 37.1 per 100 RNs). These patterns are mirrored among the other geographic groups. Statewide, completer participants had LPN-to-RN ratios 50 percent higher than withdrawals had (16 versus 11.3). In New York City, completer LPN-to-RN ratios was nearly double that of withdrawals (16 versus 9.3).

Table 4-6
Resident-nurse substitution in New York teaching hospitals by demonstration status

	Number of Hospitals	Residents per 100 RNs	LPNs to RNs per 100 RNs
All Observations	**108**	**22.5**	**12.5**
Never-participants	70	17.1	12.6
Participants	38	32.0***	12.2
Withdrawals	31	30.8	11.3
Completers	7	37.1*	16.0**
New York City	**52**	**33.8**	**10.3**
Never-participants	23	30.2	09.4
Participants	29	36.4	10.9
Withdrawals	22	36.2	09.3
Completers	7	37.1	16.0***
Upstate	**31**	**12.3**	**16.5**
Never-participants	25	11.5	15.5
Withdrawals	6	15.2	20.4

NOTES:

* = p<.10; ** = p<.05; *** = p<.01.

All means are unweighted. The sample includes Phase I and Phase II participants and excludes non-PPS hospitals. Hospitals in the demonstration less than six months are considered non-participants.

SOURCE: RTI analyses of New York Institutional Cost Reports, 1996.

4.4 Multivariate Analysis of the Participation Decision

4.4.1 Empirical Estimation Methods

Two estimation methods were employed to isolate characteristics distinguishing sites that completed the demonstration from “temporary” and “never” participants:

1. **Initial Participation Decision**: Binary (0,1) logit;
2. **Participation, then Withdrawal, Decision**: Nested logit.

We cannot directly quantify any providers’ expected total benefits of participating, but we can hypothesize that these unobserved gains or losses are determined by a number of latent factors. Recognizing the underlying uncertainty in the decision, we propose a probability model linking each provider’s expected net benefit from participating to the five factors listed above in the modeling section:

$$\text{Pr[participating]} = \text{Pr[E[net financial benefit]}_{\text{part}} > T_h \,] \tag{4.1}$$

where Pr[participating] equals the probability of participating, E[net financial benefit]$_{\text{part}}$ is the expected net benefit to participating over not participating, and T_h is hospital *h*’s own threshold of net non-financial costs to participating. The probability of participating is assumed to be positively related to the expected financial gains to participating, offset by the financial benefits to not participating, weighted against perceived non-financial (psychic and organizational) “costs” unique to the institution. Financial factors are presumably captured in the three domains of volume, payer mix/finances, and staffing substitution costs. Residency program and affiliation characteristics reflect the non-financial “costs” or barriers to participation.

The dependent variable in this analysis, *P*, is a (0, 1) indicator of participation, equal to one if the hospital participated in the demonstration; zero otherwise. Binary logit estimation is employed. As hospitals take on certain characteristics, the probability of participating rises or falls, either because they increase (decrease) the financial gains to participating or because they lower (raise) the non-financial “barriers.” The base period explanatory variables proposed for the five domains include:

- *Volume Factors*
  1. Change in total inpatient days, 1995–1997*
  2. Change in total outpatient visits, 1995–1997*
- *Program Characteristics*
  1. Ratio of residents to ADC, 1995
  2. Share of residency programs with fewer than two FTE residents
  3. Share of residents in primary care programs
  4. Share of residents in medical specialty programs
  5. Share of residents in “other” specialty programs

6. Share of residents who are International Medical Graduates (IMGs)*

- *Affiliation Characteristics*
  1. Whether the hospital had a major affiliation with a medical school in 1996
  2. Whether the hospital is an Academic Medical Center
  3. Whether the hospital is a member of HHC*
- *Payer Mix and Other Financial Characteristics*
  1. Medicare day share, 1996*
  2. Medicaid day share, 1996
  3. Indicator for safety-net hospital
  4. Average total margin, 1995–1997
- *Staffing and Substitution Possibilities*[21]
  1. Ratio of residents to RNs, 1995
  2. Ratio of LPNs to RNs, 1995.

Table 4-7 presents summary statistics of these variables for all hospitals in the sample. Only asterisked variables were used to distinguish withdrawals from continuing participants in nested logit and duration analyses described later. The number of observations used to compute the summary statistics for each variable varies slightly due to missing data for some hospitals for some variables.

In addition to the five domains of explanatory variables, we also include indicators for a hospital's location, whether in New York City or in the New York suburban ring (upstate is the omitted category). Location-specific indicators capture some of the otherwise unobservable factors that led to participation or non-participation that may be common within geographical areas. For example, the Greater New York Hospital Association (GNYHA), a provider organization composed of hospitals in the New York City metropolitan area, encouraged its members to participate and helped participants complete their applications.

As shown in Table 4-7, New York teaching hospitals on average exhibited declining inpatient volume (down nearly 13 percent) but increasing outpatient volume (up over 21 percent) over the period from 1995 to 1997. The average share of residents in primary care programs prior to the demonstration was nearly one-half (48 percent). Average specialty shares were seven percent for medical specialties and 20 percent for "other" specialties, e.g., emergency medicine, radiologists. The average IMG share was over 46 percent. The average Medicare share of days prior to the demonstration was over 43 percent, compared to an average Medicaid days share of 23 percent. Nearly one-half (48 percent) of teaching hospitals are located in New York City, 23 percent are located in the New York City suburban ring, and 29 percent were in upstate New York.

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[21] Relative wages of residents, RNs, attendings, and other potential substitutes did not vary enough within New York to be included as explanatory variables.

Table 4-7
Summary statistics of explanatory variables, all New York teaching hospitals

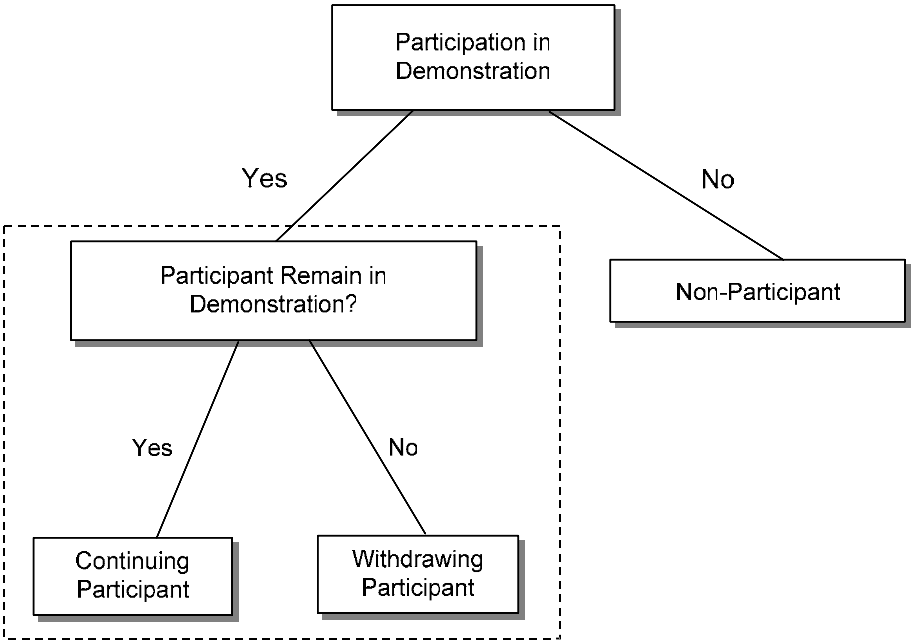
Variable	Number of obs.	Mean	Standard deviation	Min.	Max.
Volume factors					
Change in inpatient days, 1995-1997 (%)	108	-12.94	12.69	-69.26	26.02
Change in outpatient visits, 1995-1997 (%)	106	21.45	51.45	-54.24	263.18
Program characteristics					
Ratio of residents to ADC, 1995	105	0.28	0.21	0.01	0.85
Proportion of programs with <2 residents (%)	103	51.59	30.21	0.00	100.00
Primary care resident share (%)	103	48.32	31.16	0.00	100.00
Medical specialty resident share (%)	103	7.07	12.32	0.00	55.56
Other specialty resident share (%)	103	20.47	22.15	0.00	100.00
IMG resident share (%)	103	46.69	29.69	0.00	100.00
Affiliation characteristics					
Major med. school affiliation indicator	108	0.54	0.50	0.00	1.00
Academic medical center indicator	108	0.09	0.29	0.00	1.00
HHC hospital indicator	108	0.08	0.28	0.00	1.00
Payer Mix and Other Financial Characteristics					
Medicare day share, 1996 (%)	108	43.59	13.93	5.46	67.04
Medicaid day share, 1996 (%)	108	23.13	19.47	0.00	84.40
New York safety-net hospital indicator	108	0.31	0.46	0.00	1.00
Average total margin, 1995-1997 (%)	107	0.61	3.80	-12.96	10.23
Staffing characteristics					
Ratio of Residents to RNs, 1995	103	0.22	0.20	0.00	1.48
Ratio of LPNs to RNs, 1995	103	0.12	0.10	0.00	0.49
Location indicators					
New York City indicator	108	0.48	0.50	0.00	1.00
NYC suburban ring indicator	108	0.23	0.42	0.00	1.00
Upstate indicator	108	0.29	0.45	0.00	1.00

SOURCE**:** RTI analyses of Medicare Cost Reports, New York Institutional Cost Reports, and CMS IRIS data.

Teaching hospitals in New York had to decide among three possible participation alternatives: (1) to never participate, (2) to withdraw from the demonstration after participating for some length of time, or (3) to continue participating (see ***Figure 4-1***). The three-choice model can be estimated either using conditional or nested logit estimation techniques. Nested logit is preferred because it allows for the possibility that participants are more like each other than never-participants when considering whether to remain in the demonstration or participate with the option of later withdrawing. Nested logit models were estimated using Full Information Maximum Likelihood techniques. This approach estimates the two choices simultaneously and produces two sets of explanatory variables that explain participation and subsequent withdrawals using all information from the data set at each stage. It also allows us to isolate an HHC effect among participants. There are some drawbacks to this approach, however.

Figure 4-1

Hierarchical (nested) model for characterizing never-participants, withdrawals, and continuing participants



SOURCE: RTI International.

First, it divides the sample into three choices instead of two, reducing group sample sizes and power to correctly identify significant key variables. Second, because the number of continuing participants is so small, the second stage of the model predicting the likelihood of remaining in the demonstration requires a more parsimonious set of explanatory variables (see asterisked variables in above). These explanatory variables were selected on the basis of case study interviews and from seemingly important hospital characteristics in Section 4.2.

There are reasons to believe that a hospital's medical school affiliations may have affected its likelihood of participating. If a hospital shared a residency program with other hospitals, it may not have been able to unilaterally make cuts to its component of that program.[22] To control for this possibility of inter-dependence of the idiosyncratic effects on the probability of participating,[23] we construct "clusters" by grouping hospitals with the same major or graduate medical school affiliation during the three years leading up to the demonstration, as defined by the American Medical Association (1993, 1994, 1995).[24] These clusters are then used to compute Huber–White robust standard errors (see, for example, Greene, 2000 or Stata Corporation, 2001). Health and Hospitals Corporation (HHC) hospitals suffer from the same interdependence and, hence, were combined into a single observation.[25] This was done by summing inpatient days, outpatient visits, resident counts, bed counts, et cetera, across all HHC hospitals, then computing new values of the explanatory variables used in the analysis. Creating a single composite HHC observation is a more conservative statistical approach that should avoid "overweighting" a single participation decision. We also estimate alternative participation models in which HHC hospitals are included individually or are omitted altogether from the estimation. Omitting all HHC hospitals explicitly recognizes the fact that the HHC indicator is a "perfect predictor" of participation.

4.4.2 Results: Participation Decision

The first two columns of ***Table 4-8*** (under the heading, "HHC Hospitals Included as One Observation") summarize the effects of the explanatory variables found to be statistically significant on the probability of participating--with and without controlling for geographic location. Using a one-standard deviation change in each continuous explanatory variable controls for differences in variability across these variables. Calculated impacts, consequently, can be directly compared in terms of importance in explaining participation.

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[22] Conversely, some medical schools may in fact encourage their affiliated hospitals to participate due to a feeling that the demonstration was good public policy; the Buffalo consortium, affiliated with SUNY Buffalo, is an example of this case.

[23] Regression error terms for inter-dependent hospitals will be positively correlated, thereby violating a basic regression assumption and overstating statistical confidence.

[24] A hospital with a "major affiliation" with a medical school provides "clerkship experience in two or more of the major specialties of internal medicine, surgery, pediatrics, and obstetrics-gynecology." Furthermore, "medical students serve clinical clerkships regularly on inpatient services, under the direct supervision of medical school faculty." A hospital with a "graduate affiliation" must satisfy at least one of the following criteria: the house staff of the programs are selected by medical school officials; medical school faculty, other than hospital attendings, must regularly participate in the teaching programs; there is a contract specifying medical school supervision of the residency programs; or there is some exchange between the hospital's residents and the medical school's principal teaching hospital. (American Medical Association, 1995).

[25] During case study interviews conducted at participation hospitals, we discovered that the initial decision for HHC hospitals to participate was effectively made by HHC Central Office.

Table 4-8
Impact of significant[a] probability of participating in the demonstration

	HHC hospitals included as one observation		All HHC hospitals included separately	
Explanatory Variable	No location indicators	With location indicators	No location indicators	With location Indicators
Average predicted probability of participating (%)	30.6 %	30.6 %	37.0 %	37.0 %
One-standard deviation increase[b]				
Change in inpatient days, 1995-1997 (%)	-10.3 **	-10.6 **	-9.7 **	-9.7 **
Medical specialty resident share (%)	+9.9 *	+9.7 *	…[d]	…[d]
Other specialty resident share (%)	-11.5 *	-13.2 **	-10.9 **	-12.4 **
IMG share (%)	+20.2 **	+24.2 **	+18.1 *	+21.3 **
Medicaid share, 1996 (%)	+10.2 *	…[d]	+10.8 *	+12.4 *
Increase from zero to one[c]				
Academic medical center indicator	+26.6 *	…[d]	+25.7 *	…[d]

NOTES:

[a] *p<.10; **p<.05.

[b] For continuous variables, marginal effect on participation probability based on one standard deviation from variable mean.

[c] For binary variables, a standardized change is equal to an increase from zero to one.

[d] Variable not statistically significant for the particular model specification.

SOURCE: RTI analyses of participation in the New York GME Demonstration.
Computer Runs: JIMST57C (4/2/02) 8JIMST57B (4/2/02).

The estimated baseline probability of participating (the average predicted probability of participating among all teaching hospitals) equals 30.6 percent after excluding all teaching hospitals in the demonstration for less than six months. One important predictor of participation in the demonstration is the change in acute inpatient days. Hospitals with unchanged inpatient volume from 1995-97 (equivalent, coincidentally, to one standard deviation above the mean volume change of –12.9 percent; see ***Table 4-7***) were 10.3 to 10.6 percentage points less likely to participate, or one-third less likely compared to the overall 30.6 percent likelihood.

Specialty shares were also important predictors of participation in the demonstration. However, the direction of the impacts of changes in these shares differs strongly by specialty orientation. Hospitals with medical specialty shares one standard deviation above average had a one-third higher likelihood of participating (40.5 = 30.6 + 9.9 percent versus 30.6 percent). On the other hand, hospitals with greater shares of residents in "other" specialties (e.g., radiology, anesthesiology, pathology, emergency medicine, and miscellaneous) tended to be less likely to participate. This result is inconsistent with case study interviews and participant annual reports showing major reductions in hospital-based residencies (except Emergency Medicine residents). One possible explanation is that several hospitals had already downsized their RAP programs just prior to joining the demonstration.

A hospital's IMG share appears to be the most important independent predictor of participation. A hospital with an IMG share one standard deviation above average was at least 20 percentage points, or two-thirds, more likely to participate on average, holding all other variables constant. This is consistent with the hypothesis that hospitals relying heavily on IMGs were particularly interested in downsizing residency programs.

AMCs and hospitals with higher Medicaid shares were more likely to participate, initially, in the demonstration than otherwise, holding all other factors fixed. Two points must be noted, though. First, AMCs tended to have the highest "other" resident specialty shares, the lowest IMG shares, and smaller pre-demonstration declines in inpatient days. All of these factors would offset the "pure" AMC effect, and no AMCs remain in the demonstration. Second, a hospital's Medicaid share may have been proxying New York City location. The encouragement that GNYHA staff provided NYC hospitals may have been as much a reason for participating as greater Medicaid dependency.

The rightmost two columns of Table 4-8 present results when HHC hospitals are included individually and, hence, are given greater weight. First, the medical specialty share ceases to have a statistically significant impact on the likelihood of participating. Second, the Medicaid day share becomes a consistent, strong predictor of participation. These differences are expected: HHC hospitals have lower specialty shares and are more Medicaid dependent. They also all participated, initially. Whether HHC participation should be modeled as one or several observations depends on how many HHCs would have joined the demonstration on their own. Based on case study interviews, several reported that they would have joined but probably not all eleven HHCs. Thus, it seems reasonable to conclude that Medicaid dependence, a possible proxy for financial stress, encouraged participation regardless of upstate or downstate location. One could also conclude that, among non-HHC teaching hospitals, medical (versus surgical) residency orientation encouraged participation.

Several explanatory variables do not appear to affect participation. Major medical school affiliation, or even AMC status, likely had no net effect. Only Medicaid dependency was significant; not Medicare dependency or total margins. Neither of the staffing characteristics, included to reflect substitution possibilities, were significant, nor was hospital upstate or downstate location once specific hospital characteristics (e.g., Medicaid and HHC status) were held constant. It should be kept in mind, though, that these results treat all participants equally if they remained in the demonstration more than six months. We now turn to results that more finely discriminate among participants.

4.4.3 Results: Participation, then Withdrawal Decision

Using nested logit estimation, ***Table 4-9*** summarizes the effects of the explanatory variables found to be statistically significant in describing both initial participation and subsequent withdrawals. The top set of results capture the factors influencing the initial participation decision while the bottom set indicate the factors significantly affecting the likelihood of remaining in the demonstration through 2001 (four years). The first column of Table 4-9 summarizes the results for a model that does not control for location-specific reasons for participating. The second column controls (includes) location-specific indicators.

Table 4-9
Impact of significant[a] variables on the "nested" probability of participating then continuing in the demonstration through 2001

	Location indicators			
Explanatory variable	Excluded		Included[e]	
Initial participation decision				
Baseline probability of participating [d]	37.0	%	37.0	%
Change in inpatient days, 1995-1997(%) [b]	-11.2	**	-11.3	**
IMG share (%) [b]	+13.7	*	+17.1	**
Continuing, then withdraw decision				
Baseline probability of continuing (%) [d]	9.6		9.5	
Medicare share, 1996 (%) [b]	-6.3	*	-4.7	*
HHC indicator [c]	+15.9	*	+15.5	*

NOTES:

a *p<.10; **p<.05.

b For continuous variables, marginal effect on participation probability based on one standard deviation from variable mean.

c For binary variables, a standardized change is equal to an increase from zero to one.

d Variable not statistically significant for the particular model specification.

e Includes indicators for NYC and NYC suburban ring.

SOURCE: RTI analyses of participation in the New York GME Demonstration.
Computer Run: JIMST584 (4/2/02).

The pre-demonstration change in inpatient days and the IMG resident share are shown to have significant, but opposite, effects on the likelihood of initially participating in the demonstration. Compared to the "average" 37 percent probability that a New York teaching hospital would participate, hospitals with negative growth (one standard deviation) in inpatient days were 11 percentage points, or roughly one-third, less likely to participate. A hospital with an IMG share one standard deviation above average had a 13.7 to 17.1 percentage point greater probability of participating.

Two explanatory variables distinguish continuing participants from withdrawals. First, providers with higher Medicare day shares were slightly less likely to continue. Second, HHC hospitals were roughly 15 percentage points more likely to remain in the demonstration than would an otherwise similar non-HHC hospital. Non-HHC hospitals had a baseline 9.5 percent likelihood of continuing in the demonstration. Therefore, all else equal, an HHC participant was more than 2.5 times (= 9.5 + 15.5 = 25.0/9.5) more likely to remain in the demonstration. This is true even though six of the 11 HHC hospitals eventually withdrew. Because the small sample size limits the statistical precision of many of the estimated impacts of explanatory variables, there are some variables, including IMG share, that had large, but not quite statistically significant, impacts on likelihood of remaining in the demonstration.

4.5 Summary of Results

Key findings regarding hospital participation are summarized in Exhibit 4-1.

Exhibit 4-1
Key findings: Hospital participation in demonstration

Issues	Findings
Initial Participation	1. 49 of 108 teaching hospitals participated at some time during the demonstration. 2. Only 7 hospitals completed the full 6 years of the demonstration. 3. Only 6 of 31 upstate teaching hospitals participated for more than a few months in the demonstration. 4. Volume declines for never-participants prior to the demonstration were far less than for participants. 5. Although the rules of participation did not mandate IMG reduction targets, it appears that the demonstration attracted hospitals highly dependent upon foreign residents to fill their residency slots
Characteristics of Continuing Participants	6. Continuing participants had far lower Medicare volumes than other teaching hospitals. 7. The share of IMGs was far higher in the 7 hospitals completing the demonstration. 8. When early participants learned that the BBA payment reductions were less than originally anticipated, followed by partial rollbacks of these reductions in the BBRA, many hospitals felt that participating was no longer financially desirable and they withdrew. 9. Hospitals with higher Medicare shares of inpatient days were more likely to withdraw 10. HHCs were 2.5 times more likely than other teaching hospitals to continue in the demonstration
Transition Payment Incentives	11. The 7 hospitals completing the demonstration would likely have reduced their resident counts by nearly all of the required 20-25 percent without transition payments because of large declines in inpatient volumes.

SECTION 5
RESIDENT REDUCTION COUNTS AND REDUCTION STRATEGIES

5.1 Introduction

This section of the final report extends the previous section's analysis of New York teaching hospitals by, first, describing the major strategies providers used to meet their reduction targets and then how successful they were. Qualitative and theoretical analysis is used to explain the strategies employed. Quantitative analysis of trends in residents among both continuing participants and withdrawals addresses the success of these strategies. The section concludes by drawing policy implications for the potential success and challenges that might face teaching hospitals in voluntarily reducing residents in the future.

The original CMS RFP provided an extensive list of questions to guide the research in this section. Summarizing the key questions:

- Did the demonstration sites meet their targets for reducing the size of their physician residency program? Did any exceed their goals? How many were not successful in achieving their goals?
- How did the characteristics (age, race, origin, specialty) of the residents in the demonstration sites change? In successful versus unsuccessful sites?
- What criteria did participating institutions apply in implementing the downsizing of their residency programs? Were there significant differences by hospital mission, type or training program size?
- Was the size of the primary care residency training in the demonstration sites affected?
- Did any demonstration sites totally abandon their residency programs, or for particular specialties?
- What strategies did demonstration sites use to maintain delivery of patient services?
- Did other hospital inputs rise in response to a fall in residents? If so, which inputs? What happened to attending physicians?
- Was the shift in input mix greater (or different) in demonstration versus non-demonstration hospitals?

The rest of this chapter first presents a model of how sites developed and implemented various strategies for reducing residents. The model, based on extensive interviews with hospital financial and program directors, lays out the key factors molding the strategy, the obstacles faced by decision-makers, and why they might have later withdrawn. This is followed by a set of results describing changes in residents among completing and withdrawing participants versus never participants.

5.2 Modeling Reduction Strategies

A hospital's downsizing strategy was formed in two distinct parts. First came the decision to participate. This involved submitting a demonstration application. Time was short and managers could only briefly assess the need for maintaining resident complements and how the organization might accomplish the sizable 20-25 percent reductions required. From site interviews with CFOs and program managers, the initial decision to participate was based more on external factors and the hospital's general financial and competitive position in the market. The question was whether it made any financial sense to forego Medicare IME and DME payments—especially when supplemented by significant state Medicaid training subsidies as well. In answering this question, the one trend that sites could forecast reasonably well was their own inpatient volumes, although even then the conversion of Medicaid to managed care was a big unknown. Sites with recent significant declines in inpatient days had three reasons for downsizing residents:

1. Fewer residents were needed for clinical care;
2. Fewer, if any, attending and clinical staff replacements would be needed; and
3. Resident Review Committee (RRC) patient volume quotas for residents would be more difficult to meet.

The composition and perceived quality of their programs was also reasonably well known beforehand. Very IMG-dominated programs were considered of lower quality by many of the staff we interviewed. However, IMGs were largely concentrated in the primary care specialties, e.g., pediatrics, which could not be downsized any more than specialty care training programs given the CMS requirement that sites maintain their primary care share.

Less well understood by managers would be how they would implement a downsizing strategy that would meet the overall demonstration requirements given that their facility was a logical candidate. Interestingly, several managers decided to participate against their organization's own best interests—and against the financial advice of their CFO. Their inpatient volumes remained reasonably strong. They were not overly dependent upon IMGs. They had a large number of non-primary care programs that would have to be downsized significantly to meet the 20-25 percent criterion. And they had a notable regional or, in some cases, national reputation. Two arguments were offered for why they, too, joined the demonstration:

1. America was over-specialized and more primary care residents were needed; and
2. Congressionally mandated reductions in GME payments, anticipated in the 1997 BBA, would be substantial thereby rendering residents no longer cost effective.

The resulting mix of participants, while reflecting some of the characteristics congenial to downsizing, was a heterogeneous group. The real test came in the second stage implementation of a practical downsizing plan.

Downsizing strategies evolved. Most participants did not have a formal, written, plan that set out residency program reductions for the long term. Only one HHC hospital was an exception to the rule, having begun a downsizing strategy in the early 1990s. This site was motivated to downsize by declining volumes, difficulties in attracting qualified residents, and concerns about the quality of both the training programs and clinical care. Other sites forged a “strategy” based on the following considerations:

- Clinical Care Needs;
- Rotations, Affiliations, and Mergers;
- RRC Requirements; and
- Program Size and Specialty Mix.

5.2.1 Clinical Needs & Substitutability of Staff

The need for residents is considered a derived demand to the extent that they take care of patients as part of their training. Declining inpatient volumes lower the demand, or need, for residents. Declining volumes also reduce the need for other clinical staff such as RN’s and attending physicians. Exactly how much less is needed of which kind of staff depends upon:

- the changing mix of patients in the facility; and
- the degree of substitutability between residents and other staff.

Lower volumes in New York were driven in fair part by shorter stays and earlier discharges. Significant declines in discharges would require fewer residents. Eliminating the last few days of a patient’s stay generally has more effect on the demand for RN time than resident time because of the latter’s intensive involvement in diagnosis and treatment early on in the stay—especially for surgical residents.

Also taken into consideration was the required mix of staff in providing particular services to patients. Support services like radiology and pathology, are subject to extensive oversight of residents by attendings. The result is a duplication of work. Residency programs in “duplicative” specialties were particular targets for downsizing. A similar arrangement exists in the operating room as well, but considerable flexibility in attending-resident involvement still exists in the pre- and post-operative phases.

5.2.2 Rotations, Affiliations, & Mergers

Downsizing plans in several hospitals were immediately rendered obsolete by a merger or affiliation change with another hospital or medical school. Either the shift to another group of attending physicians or to a merger put too much strain on the planning capabilities of managers and the adaptability of staff. In other cases, hospitals with sizable out-rotation programs found themselves having to “take back” residents as participating facilities scrambled to eliminate residents from their “Medicare books.”

RRC Requirements. As managers began the challenging task of identifying programs to downsize, certain RRC requirements presented unexpected obstacles. First, programs generally must maintain at least a minimum size. Reductions beyond the minimum require the total elimination of the program—not and easy organizational decision to make or carry out. Second, residents must meet specified patient volumes in order to achieve competency. These may be out-of-line with reductions in patient volumes. Programs with larger percentage declines in clinical needs may have been nearer to the volume minimums to begin with. Third, the RRC delegates of ACGME evaluate the overall quality of the training programs and may demand reductions again out-of-line with volume declines or with the demonstration's requirement to maintain its primary care ratio.

5.2.3 Program Size & Specialty Mix

How many different residency programs a hospital was supporting, and how large they were, played a role in downsizing strategies. The primary care share of all residents became a serious downsizing issue given the requirement to maintain the share at base year levels. The greater the share in the base year, the greater the percentage reduction required in specialty programs in order to simultaneously meet both demonstration downsizing criteria: With a diverse set of specialty training programs, downsizing specialty residents inevitably meant eliminating whole programs. This is organizationally difficult to do. Conversely, a few large programs are more easily, and equitably, downsized by similar percentages.

- Reduce total FTE residents by 20-25 percent; and
- Maintain the primary care residency share at least at the base year level.

The impact of these two criteria on required reductions in specialty residents is sensitive to the base year primary care share itself. The percent change in total residents in a site is simply a weighted average of the percentage change from the base year in primary care and specialty residents, i.e.,

$$\text{(5.1)} \qquad \%\text{change TR} = \%\text{change PC x (PC/TR)} + \%\text{change SP x (SP/TR)}$$

where TR = a site's total FTE residents
PC = primary care FTE residents
SP = specialist care FTE residents.

The weights are base year shares of the two kinds of residents. If we assume that the primary care share is fixed at the minimal base year ratio, i.e., (PC/TR) = M and (SP/TR) = (1 – M), then, assuming a minimum percent reduction, K%, in total residents, and solving for the tradeoff between the two,

$$\text{(5.2)} \qquad \%\text{change SP} = [K\% - M \text{ x } \%\text{change PC}]/(1 - M),$$

the required reduction in specialty residents is seen to depend upon two parameters, K% and M, as well as the actual reduction, if any, in primary care residents.

Table 5-1 simulates the percent reductions in specialty residents required for various base year primary care ratios and for given changes in primary care residents ranging from a +5 percent to a -20 percent, assuming the minimum 20 percent reduction in total residents. With no change in primary care residency counts, specialty residents would have to fall from 26.7 to (an infeasible) 133.3 percent depending upon how primary care oriented the site was. For example, a site would have to reduce its specialty resident count 80 percent in order to meet a 20 percent reduction in overall residents if it decided not to cut primary care residents and was three-quarters dominated by primary care programs.

Table 5-1
Simulated percent reduction[1] in specialty residents (SP)[2] to meet New York demonstration terms and conditions

	Ratio (M)[3] of primary to all residents					
% change PC[4]	0.25	0.45	0.50	0.60	0.75	.85
+5	-28.3%	-40.5%	-45.0%	-57.5%	-95.0%	-161.7%
0	-26.7	-36.4	-40.0	-50.0	-80.0	-133.3
-5	-25.0	-32.3	-35.0	-42.5	-65.0	-105.0
-10	-23.3	-28.2	-30.0	-35.0	-50.0	-76.7
-20	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0

NOTES:

[1] Percent reductions in SPIN table assume a 20 percent reduction in total resident counts.

[2] % Change SP is simulated percent change in specialty residents based on % Change SP = [-20.0% - % Change PC * M] / (1-M)

[3] M = PC / TR which represents the proportion of all residents in primary care

[4] % Change PC is the simulated percent change in primary care residents

A few important implications for resident reduction strategies flow from this simple trade-off:

- The required decline in specialty residents is less the greater is the reduction in primary care residents.

- Conversely, the greater the primary care orientation in the base year, the greater the required percentage reduction in specialty residents for any change in primary care residents.

- Even slight reductions in primary care residents in order to meet the overall 20 percent criterion will require very substantial percentage reductions in specialty residents to maintain base year primary care ratios.

- At or greater than a base year 80 percent share of primary care residents, a site must eliminate all it specialty residents while keeping primary care residents unchanged in order to meet the two demonstration criteria.

- If a site can reduce its primary care residents by 20 percent, it only needs to reduce its specialty residents by a similar percentage regardless of how dependent it is on primary care.

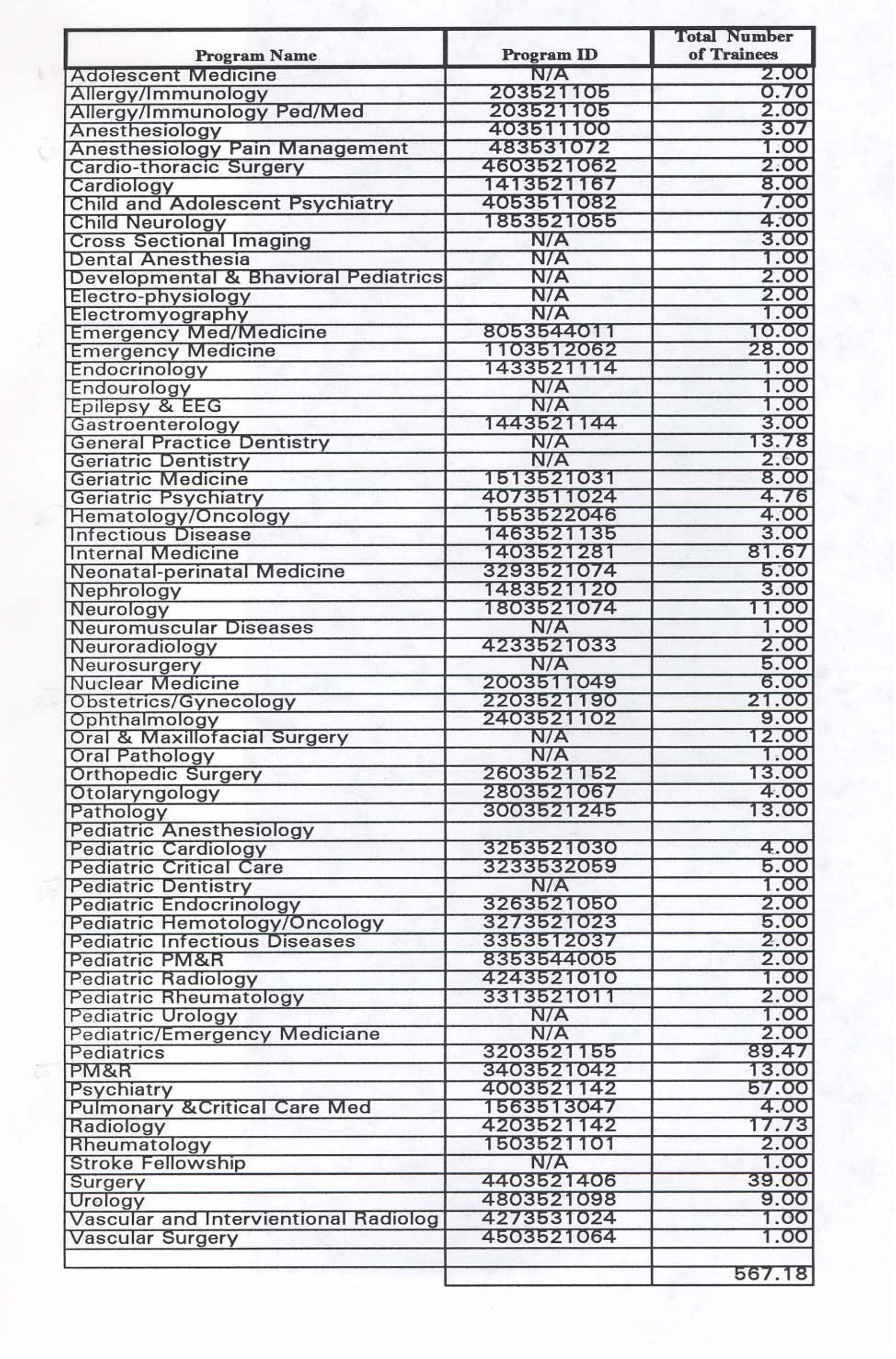
The eventual withdrawals from the demonstration averaged 45-55 percent primary care versus specialty residents. Completing participants reported a 60-40 percent primary care versus specialty composition. Table 5-1 indicates that completing participants had to make larger percentage reductions in their specialty programs than did those that eventually withdrew. this seems paradoxical. However, if primary care residents more directly supported clinical care, and volumes declined more for completing participants, then they would have been in a better position to reduce primary care programs and still meet their patients' needs. For example, completing participants and withdrawals faced similar required reductions in specialty programs (-35%) if the former reduced their primary care programs by 10 percent while the latter made no such reductions.

Also, in downsizing or eliminating high profile specialty programs (e.g., neurosurgery), sites had to consider the negative impact it would have in recruiting qualified, highly regarded, attendings. Program size issues are illustrated in Exhibit 5-1 that displays the breakdown of one participant's 64 resident programs—the site withdrew after the first year of the demonstration. Of the 567 residents as of demo year 1, only a few had over 20 residents (e.g., emergency and internal medicine) and 43 had five or fewer residents aggregated across several years of training.

Widely varying Physician Graduate Year, or PGY status, also demonstrates the difficulties of downsizing given that many specialty programs have lengthy training periods. Base period resident counts are a static picture of what is an annual flow of residents over time. Terminating a program by simply not enrolling any new trainees still will result in a few more years of residents allowed to complete their training. Program directors and hospital managers are loathe to terminate a program all at once given the disruptions for residents who need to find another practice location.

Exhibit 5-1

Residents in 1996-97 programs sponsored by participating hospital



Program Name	Program ID	Total Number of Trainees
Adolescent Medicine	N/A	2.00
Allergy/Immunology	203521105	0.70
Allergy/Immunology Ped/Med	203521105	2.00
Anesthesiology	403511100	3.07
Anesthesiology Pain Management	483531072	1.00
Cardio-thoracic Surgery	4603521062	2.00
Cardiology	1413521167	8.00
Child and Adolescent Psychiatry	4053511082	7.00
Child Neurology	1853521055	4.00
Cross Sectional Imaging	N/A	3.00
Dental Anesthesia	N/A	1.00
Developmental & Bhavioral Pediatrics	N/A	2.00
Electro-physiology	N/A	2.00
Electromyography	N/A	1.00
Emergency Med/Medicine	8053544011	10.00
Emergency Medicine	1103512062	28.00
Endocrinology	1433521114	1.00
Endourology	N/A	1.00
Epilepsy & EEG	N/A	1.00
Gastroenterology	1443521144	3.00
General Practice Dentistry	N/A	13.78
Geriatric Dentistry	N/A	2.00
Geriatric Medicine	1513521031	8.00
Geriatric Psychiatry	4073511024	4.76
Hematology/Oncology	1553522046	4.00
Infectious Disease	1463521135	3.00
Internal Medicine	1403521281	81.67
Neonatal-perinatal Medicine	3293521074	5.00
Nephrology	1483521120	3.00
Neurology	1803521074	11.00
Neuromuscular Diseases	N/A	1.00
Neuroradiology	4233521033	2.00
Neurosurgery	N/A	5.00
Nuclear Medicine	2003511049	6.00
Obstetrics/Gynecology	2203521190	21.00
Ophthalmology	2403521102	9.00
Oral & Maxillofacial Surgery	N/A	12.00
Oral Pathology	N/A	1.00
Orthopedic Surgery	2603521152	13.00
Otolaryngology	2803521067	4.00
Pathology	3003521245	13.00
Pediatric Anesthesiology		
Pediatric Cardiology	3253521030	4.00
Pediatric Critical Care	3233532059	5.00
Pediatric Dentistry	N/A	1.00
Pediatric Endocrinology	3263521050	2.00
Pediatric Hemotology/Oncology	3273521023	5.00
Pediatric Infectious Diseases	3353512037	2.00
Pediatric PM&R	8353544005	2.00
Pediatric Radiology	4243521010	1.00
Pediatric Rheumatology	3313521011	2.00
Pediatric Urology	N/A	1.00
Pediatric/Emergency Mediciane	N/A	2.00
Pediatrics	3203521155	89.47
PM&R	3403521042	13.00
Psychiatry	4003521142	57.00
Pulmonary &Critical Care Med	1563513047	4.00
Radiology	4203521142	17.73
Rheumatology	1503521101	2.00
Stroke Fellowship	N/A	1.00
Surgery	4403521406	39.00
Urology	4803521098	9.00
Vascular and Intervientional Radiolog	4273531024	1.00
Vascular Surgery	4503521064	1.00
		567.18

5.3 Resident Reduction Strategies: Descriptive Results

5.3.1 Overall Resident Counts

Table 5-2 reports trends in New York residents by participation status. According to Medicare Cost Reports, all teaching hospitals in New York had 16,260 residents as of 1996, the demonstration's base year. Over the next two years, this number fell by 1,059 residents then rose 758 residents in the next three years. The net result was a statewide decline of 271 residents, a 1.9 percent decline.

Completing participants, as well as withdrawals, exhibit negative overall trends over the demonstration's first two years, 1996-98:

- Completing Participants: -21.7%
- NYC Withdrawals: -9.3%
- Upstate Withdrawals: -5.4%.

The seven completing participants from the New York City area exhibited resident declines more than double those of withdrawals in their own area, even though withdrawals remained in the demonstration for a full year. Never participants in the NYC area reduced resident counts by less than 1 percent during the initial period through 1998.

Completing participants reduced their resident counts another 5 percentage points over the next three years, 1998-2001, but withdrawals in the NYC area increased residents by almost as much has they had reduced them in the first two years. The overall net change in residents over the demonstration's first five years, 1996-2001 was:

- Continuing participants: -25.7%
- NYC withdrawals: -1.4%
- Upstate withdrawals: -11.9%
- NYC never participants: +3.8%
- Upstate never participants: +0.9%.

Among the 37 teaching hospitals that ever participated in the demonstration,[26] they reduced total residents by 508, amounting to a 3 percent reduction in statewide residents. This reduction, however, was offset by an increase in 237 residents among never participants.

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[26] The seven Rochester hospitals that participated only for 6 months are counted as never participants.

Table 5-2
Trends in New York residents by participation status

		NYC Area		Upstate Area		
	Continuing participants	Withdrawals	Never participated	Withdrawals	Never participated	Total New York
	(7)	(25)	(41)	(5)	(21)	(119)
Total Residents						
• 1996	1,255	7,848	5,058	595	1,504	16,260
• 1998	983	7,119	5,028	563	1,508	15,201
• 2001	929	7,737	5,251	524	1,518	15,959
• 1996 - 1998	-272	-729	-30	-32	4	-1,059
• 1998 - 2001	-54	618	223	-39	10	758
• 1996 - 2001	-326	-111	193	-71	14	-301
Percent change Residents/hospital						
• 1996 - 1998	-21.7%	-9.3%	-0.6%	-5.4%	0.3%	-6.5%
• 1998 - 2001	-5.0	8.7	4.4	-6.9	0.7	5.0
• 1996 - 2001	-25.7	-1.4	3.8	-11.9	0.9	-1.9

NOTES:
Number of hospitals in parentheses

SOURCE: Medicare Cost Reports, 1996 - 2001

These findings imply that:

- Participation in the demonstration encouraged downsizing of residency programs;
- Completing the demonstration produced much larger program reductions;
- Most of the significant resident reductions made by early participants in the New York City area that later withdrew were "replaced" soon after they withdrew from the demonstration;
- Upstate Buffalo consortium of hospitals, although they eventually withdrew, maintained substantial (12%) reductions in their resident programs – at least through the demonstration's first few years.

5.3.2 Resident Trends by Completing Participants

Table 5-3 displays trends in residents for six of the seven participants that completed the demonstration. (The seventh hospital did not submit Annual Reports to CMS after Year 2.) Column (1) shows the baseline resident counts as reported by each facility. These proved to be somewhat different than CMS's count from Medicare Cost Reports, in part due to issues over the definition of the "base year." The last three columns show the reduction in residents over the demonstration's first five years, what each site's final reduction target was, and any deviation from target. Only Year 6 is missing as sites did not submit a final Annual Report. Also shown is a separate row for hospitals' E and I together. These two formed a joint participant until hospital E withdrew. Hospital I was allowed to continue.

According to Annual Reports submitted by the six sites, base year residents were reduced by 28 percent over the first five years of the demonstration. All six achieved or exceeded there target reduction percentages, although reduction "glidepaths," using participants' language, differed. While a couple of sites (B and J) consistently reduced residents through the fifth year, others made very large reductions in the first couple of years (G, H and I). Hospital I, in fact, nearly eliminated all residents. Then, when its companion facility withdrew from the demonstration, hospital I started building up its resident complement to about a third of its base year level. Putting hospitals E and I together show a net decline of about 15 percent, while I, alone, experienced a 69 percent decline. Nevertheless, the two sites combined still managed to reduce residents by three-quarters of their original goal of 20 percent.

5.3.3 Resident Trends by Major Specialty

Table 5-4 displays 5-year trends in residents by major specialty group for six reporting participants. It also shows 1-year changes for the large group of hospitals that withdrew after the end of the first year but had submitted their Annual Progress Report to CMS. All specialty groups showed declines among completing participants—at least through the first five years of the demonstration. Declines ranged from a low of -12 percent for dental residents to a high of -53 percent for surgery residents. The other two groups experiencing large declines included "other" residents (e.g., radiologists, pathologists, psychiatrists, emergency medicine) at

Table 5-3
Resident counts for New York GME demonstration participants completing the demonstration

		Demonstration Year							
Participation status	Base year	Year 1	Year 2	Year 3	Year 4	Year 5	Five year reduction (%)	Final target (%)	Deviation from target (%)
Completing Participants									
B	265	245	230	224	215	209	-21.2	-20.0	-1.2
C	269	222	218	225	226	216	-19.8	-20.0	0.2
G	93	80	77	71	71	72	-22.1	-20.0	-2.1
H	258	229	198	179	174	179	-30.6	-25.0	-5.6
I	101	90	23	6	24	32	-68.8	-20.0	-48.8
J	139	133	128	107	102	100	-27.9	-25.0	-2.7
Total (B-J)	1,125	1,000	874	812	811	808	-28.2	n/a	n/a
E + I	363	327	248	252	280	309	-14.9	-20.0	5.1
Total (B-J+E)	1,387	1,237	1,099	1,058	1,067	1,085	-21.8	n/a	n/a

NOTES: Hospital E was a participating partner with hospital I. When E withdrew after the third year, it absorbed many of I's residents. Hospital A did not provide annual reports for this analysis.

SOURCE: Participating demonstration hospital Annual Progress Reports submitted to CMS.

Table 5-4
Trends in residents by major specialty by participation status in the New York demonstration

		Demonstration year					
	Base year	Year 1	Year 2	Year 3	Year 4	Year 5	% Change (year 5 - base)
Completing participants							
Primary care[1]	612	571	511	490	492	499	-18.5%
OB/GYN	59	58	53	39	37	38	-35.4
Medical subspecialties	69	66	62	50	45	41	-40.1
Surgery	132	100	86	81	88	62	-53.0
Dental	50	51	42	42	45	44	-11.9
Other	205	154	121	110	105	108	-47.2
Total	1,125	1,000	874	812	618	808	-29.7
Withdrawals (statewide)							
Primary care	1,861	1,748					-6.1
OB/GYN	201	189					-5.9
Medical subspecialties	397	399					0.5
Surgery	786	787					0.1
Dental	141	109					-23.2
Other	1,243	1,150					-7.5
Total	4,610	4,381					-5.0

NOTES:

[1] Primary care includes internal medicine, family practice, and pediatrics.

SOURCE: Participating demonstration hospital Annual Progress Reports submitted to CMS.

-47 percent and medical subspecialties at -40 percent. Despite the requirement that participants had to maintain their share of primary care residents, the six sites eliminated more than 100 FTEs along with one-third fewer ob/gyn residents (also counted as primary care for demonstration purposes). Because primary care residents declined more slowly than other specialty residents, the six reporting completer participants showed a six percentage point increase in their primary care ratio from 60 to 66 percent.

Participants that withdrew after one year exhibited a 5 percent overall decline in residents. This is less than one-half of the 11.1 percent reduction during the first year by participants eventually completing the demonstration. The sharpest differences between completers versus withdrawers are in surgery and dental programs. Whereas completers made large, year 1, reductions in surgery residents while keeping dental residents constant (before eventually falling 12 percent), sites that withdrew kept surgery residents constant and made the largest percentage reductions in dental residents. This is somewhat inconsistent with early interviews with hospital managers who maintained they withdrew from the demonstration because they could not afford to cut their dental programs. In fact, they had lobbied to exclude dental programs from the demonstration due to perceived national shortages. First-year withdrawers also made a sizable 6 percent reduction (125 residents) in their primary care plus ob/gyn residents. This reduction was matched, percentage-wise, by completers in the demonstration.

5.3.4 Resident Trends by IMG Status

Table 5-5 displays trends in IMG residents among the six reporting participants that continued and finished the demonstration. IMGs fell 23 percent over the first five years. Reductions ranged from about 14 to 34 percent.

Table 5-6 compares trends in IMGs with USMGs for the same six hospitals. Completing participants began the demonstration with 3 IMG residents for every USMG resident. Withdrawals from the demonstration were far less dependent on IMGs with less than one IMG for every USMG. Although the reduction in IMGs was substantial, -22 percent, the reduction in USMGs was much larger—almost 44 percent. By the end of the fifth year, the completing participants had 4.3 IMGs for every USMG. The large group of withdrawal sites after the first year show a different pattern with IMGs reduced at a substantially higher rate than USMGs. This is based only on a single year, however, and may be coincidental.

5.3.5 Trends in Residents, Nurses, and Assistants

Table 5-7 compares percentage changes in residents, nurses, and nurse assistants/physician assistants (NPs and PAs) by participation status. Among completing participants, all three occupational groups experienced substantial declines with no obvious substitution of non-physician staff from residents. Nurses fell by about the same percentage as residents and nurse and physician assistants together fell by over twice the rate. These reductions likely reflect the substantial declines in inpatient days experienced in these institutions. Never-participants in New York City actually had a sizable increase in residents with an actual reduction in nurses.

Table 5-5
Trends in IMG residents for completing participants in New York demonstration

		Demonstration year					
Hospital	Base year	Year 1	Year 2	Year 3	Year 4	Year 5	% Change (year 5 - base)
B	214	206	175	174	165	166	-23%
C	202	162	153	168	168	165	-18
G	72	72	71	62	62	62	-14
H	205	192	171	154	145	152	-26
I	36	29	n/a	n/a	16	24	-34
J	121	116	110	93	86	84	-30
Total	849	777	n/a	n/a	642	653	-23

NOTES:

Excludes nonreporting hospital F
n/a: Total not available due to nonreporting hospitals

SOURCE: RTI analysis of demonstration hospital Annual Reports submitted to CMS.

Table 5-6
Levels and trends in IMGs and USMGs by participation status in the New York demonstration

	Base year		Demonstration year					
	Number	Percent	Year 1	Year 2	Year 3	Year 4	Year 5	% change (year 5 - base)
Completing participants[1]								
IMGs	849	75%	776	680[1]	652[1]	642	663	-21.9%
USMGs	276	25	223	194	160	169	155	-43.8
Total	1,125	100	999	874	812	811	808	-28.2
Withdrawals								
IMGs	1,919	46	1,797					-6.4
USMGs	2,259	54	2,172					-3.9
Total	4,178	100	3,969					-5.0

NOTES:

[1] Excludes nonreporting hospital I
Figures based on 6 of 7 reporting hospitals in most years. Withdrawals based on 23 reporting out of 30 hospitals that withdrew. Percent changes calculated only on reporting hospitals in Year 5 and Base Year.

SOURCE: RTI analysis of demonstration hospital Annual Reports submitted to CMS.

Table 5-7
Percent change (1996 - 2001) in New York residents, nurses, nurse practitioners, and physician assistants by participation status

Participation status	Residents	Nurses (RN and LPN)	Assistants (NP and PA)
Completing participants	-25.7%	-21.5%	-45.8%
Withdrawals			
• NYC	-1.4	-10.2	+17.6
• Upstate	-11.9	+16.0	-40.0
Never participants			
• NYC	+3.8	-10.4	+15.0
• Upstate	+0.9	+1.1	+18.5

SOURCE*:* Residents: Medicare Cost Reports, 1996-2001; Nurses and NPs/PAs: New York ICRs.

New York City withdrawals experienced very minor net reductions in residents, much larger reductions in nurses, and sizable increases in assistants. Fewer nurses are likely in response to falling inpatient days while more assistants could be partly in response to slightly fewer residents.

5.3.6 Trends in Residency Programs by Completer Participants

Tables 5-8A through ***5-8G*** display changes in the number of residents for each program in the seven sites that completed the demonstration. Comparisons are made between the 1996 base year through the end of year 5 of the demonstration, except for Brooklyn Hospital, where base year data exist only for year 1, and Metropolitan, which stopped submitting Annual Reports after year 2 of the demonstration. All seven completely eliminated some of their programs:

- Brooklyn: 4 eliminations out of 17 (between year 1 and 5)
- Metropolitan: 2 out of 15 (base to year 2)
- North Central Bronx: 26 our of 33 (base to year 5)
- Lincoln: 8 out of 17 (base to year 5)
- Harlem: 3 out of 20 (year 1 to year 5)

Table 5-8A
Changes in resident specialty mix among completer participants: Brooklyn Hospital Center

Program	Base year (17)[1]	Year 5
Primary Care:	**154.72**	**142.97**
Internal medicine	93.35	84.95
Family practice	11.87	12.88
Pediatrics	32.50	29.14
Obs/Gyn	17.00	16.00
Non-primary care:	**90.69**	**65.85**
Surgery	27.52	21.83
Anesthesia	6.67	0.00
Cardiology	7.18	4.37
Dentistry	4.92	4.00
Emergency medicine	22.49	20.76
Gastroenterology	4.00	3.01
Hematology/oncology	2.84	3.00
Oral maxillofacial surgery	4.00	4.88
Orthopedic surgery	2.00	0.00
Pathology	2.28	0.00
Podiatry	3.00	0.00
Pulmonary	2.79	3.00
Urology	1.00	1.00
Total	**245.41**	**208.82**

NOTES:

[1] Number of programs.

SOURCE: RTI summary of participant annual progress reports submitted to CMS.

Table 5-8B
Changes in resident specialty mix among completer participants: Metropolitan Hospital Center

Program	Base year (15)[1]	Year 2
Primary care	**117.81**	**102.09**
Internal medicine	75.52	70.54
OB/GYN	9.00	9.00
Pediatrics	33.29	22.55
Non-primary care	**103.99**	**79.48**
Anesthesia	9.46	6.00
Dermatology	2.93	3.00
Emergency medicine	16.77	13.52
Neurology	3.00	1.00
Ophthalmology	3.76	3.68
Oral/maxillo surgery	7.89	5.98
Pathology	4.81	0.00
Psychiatry	30.34	28.30
Radiology	1.75	0.00
Rehabilitation med	9.92	6.00
Surgery	10.81	9.69
Urology	2.55	2.31
Total	**221.80**	**181.57**

NOTES:

[1] Number of programs.

SOURCE: RTI summary of participant annual progress reports submitted to CMS.

Table 5-8C
Changes in resident specialty mix among completer participants: North Central Bronx Hospital

Program	Base year(33)[1]	Year 5
Primary care residents	**75.15**	**21.48**
Family medicine - family practice	3.51	0.00
Family medicine - social int. medicine	3.20	0.00
Family medicine - social pediatrics	1.81	0.00
Internal medicine	38.00	21.48
OB/GYN	4.84	0.00
Pediatrics	23.79	0.00
Non-primary care residents	**25.68**	**9.98**
Anesthesiology	1.61	0.00
Cardiology	1.43	0.25
Dermatology	0.73	0.00
Diagnostic radiology	1.05	0.00
Emergency medicine	0.61	1.33
Endocrinology/metabolism	0.24	0.00
Gastroenterology	2.00	1.00
Geriatrics	0.22	0.00
Hematology/oncology	1.12	0.00
Infectious diseases	1.05	0.00
Nephrology	1.14	0.00
Neurology	0.31	0.00
Nuclear medicine	0.10	0.00
Ophthalmology	1.00	0.00
Otolaryngology	0.22	0.00
Pathology	0.01	0.00
Pediatrics infectious disease	0.27	0.00
Pediatrics neonatology	1.34	0.00
Physical medicine & rehabilitation	3.76	0.00
Podiatry	0.00	0.59
Psychiatry	0.62	0.00
Pulmonary diseases	1.02	0.00
Rheumatology	0.26	0.00
Surgery general	3.34	5.34
Surgery neurological	0.17	0.00
Surgery orthopedic	1.46	1.47
Surgery plastic	0.17	0.00
Surgery urology	0.43	0.00
Total	**100.83**	**31.46**

NOTES:

[1] Number of programs.

SOURCE: RTI summary of participant annual progress reports submitted to CMS.

Table 5-8D
Changes in resident specialty mix among completer participants: Lincoln Medical and Mental Health Center

Program	Base year(17)[1]	Year 5
Primary care	**143.34**	**145.60**
Internal medicine	82.79	77.57
OB/GYN	11.92	11.34
Pediatrics	48.63	56.69
Non-primary care	**125.81**	**70.14**
Anesthesiology	9.77	0.00
Dentistry - other	8.00	9.44
Dermatology	3.15	3.67
Emergency medicine	28.77	27.84
ENT	1.92	0.00
Neurology	0.93	0.00
Ophthalmology	5.77	0.00
Orthopedics	6.66	0.00
Pathology	4.42	0.00
Psychiatry	17.01	13.00
Radiology	9.08	0.92
Rehab medicine	0.34	0.00
Surgery	26.94	15.27
Urology	3.05	0.00
Total	**269.15**	**215.74**

NOTES:

[1] Number of programs.

SOURCE: RTI summary of participant annual progress reports submitted to CMS.

Table 5-8E
Changes in resident specialty mix among completer participants: Harlem Hospital Center

Program	Base year (20)[1]	FY02
Primary care	**107.12**	**91.42**
Internal medicine	76.61	72.71
Obstetrics/gynecology	13.01	0.00
Pediatrics	17.50	18.71
Non-primary care	**121.60**	**87.49**
Child psychiatry	3.00	2.99
Dentistry	8.66	9.89
Cardiology	6.84	0.00
Gastroenterology	2.00	2.76
Hematology/oncology	0.50	0.92
Infectious disease	4.16	3.84
Nephrology	2.00	1.92
Pulmonary	3.39	4.00
Neurology	4.08	3.90
Ophthalmology	2.00	0.43
Oral & maxillofacial surgery	7.00	4.00
Orthopedics	4.00	0.00
Pathology	8.00	2.00
Podiatry	0.00	2.00
Psychiatry	32.59	16.54
Radiology	8.90	10.05
Surgery general	22.48	19.41
Surgery plastics	2.00	2.84
Total	**228.73**	**178.89**

NOTES:

[1] Number of programs.

SOURCE: RTI summary of participant annual progress reports submitted to CMS.

Table 5-8F
Changes in resident specialty mix among completer participants: Queens Hospital Center

Program	Base year (15)[1]	FY02
Primary care	**66.14**	**60.07**
Internal medicine	55.55	49.57
OB/GYN	10.59	10.50
Non-primary care	**26.52**	**12.10**
Cardiology	1.80	0.00
Dental medicine	4.00	2.59
Endocrinology	0.54	0.00
Gastroenterology	0.61	1.01
Hematology/oncology	0.61	1.00
Ophthalmology	5.18	5.00
Oral surgery	2.09	0.00
Otolaryngology	2.12	0.50
Pathology	2.00	0.00
Physical medicine & rehab	4.00	0.00
Psychiatry	2.15	0.00
Pulmonary medicine	0.50	2.00
Rheumatology	0.92	0.00
Total	**92.66**	**72.17**

NOTES:

[1] Number of programs.

SOURCE: RTI summary of participant annual progress reports submitted to CMS.

Table 5-8G
Changes in resident specialty mix among completer participants: Interfaith Medical Center

Program	Base year(10)[1]	FY02
Primary care	**103.78**	**75.14**
Internal medicine	88.17	75.14
Pediatrics	15.61	0.00
Non-primary care	**33.07**	**25.25**
Cardiology	4.00	2.25
Dentistry	8.67	9.00
Endocrinology	2.00	0.00
Gastroenterology	3.00	0.50
Hematology/oncology	1.00	0.00
Ophthalmology	6.00	6.00
Podiatry	4.00	5.00
Pulmonary	4.00	2.50
Surgery	0.80	0.00
Total	**137.25**	**100.39**

NOTES:

[1] Number of programs.

SOURCE: RTI summary of participant annual progress reports submitted to CMS.

- Queens: 7 out of 15 (base to year 5)
- Interfaith: 4 out of 10 (base to year 5).

In all, 54 programs were eliminated out of 127, a 43 percent dissolution rate. This rate is understated by an unknown extent because (a) not all hospitals reported both base and year 5 statistics, and (b) no updates in resident counts were reported in year 6, the last year of the demonstration. On the other hand, North Central Bronx accounts for 26 of the 54 eliminated programs. Their high dissolution rate was due to a relocation of a large number of residents to Jacobi Hospital, NCB's joint partner at the start of the demonstration. Jacobi dropped out of the demonstration during year 2. Excluding NCB, the program dissolution rate was 28 out of 94 programs, or 30 percent.

Again ignoring NCB, which was more of a relocation than a wholesale elimination of programs, the programs eliminated were:

- Brooklyn: Anesthesia; orthopedic surgery; pathology; podiatry
- Metropolitan: Pathology; radiology
- Lincoln: Anesthesia; otolaryngology; neurology; ophthalmology; orthopedic surgery; pathology; rehab medicine; urology
- Harlem: Cardiology; ob/gyn; orthopedic surgery
- Queens: Cardiology; endocrinology; oral surgery; pathology; rehab medicine; psychiatry; rheumatology
- Interfaith: Pediatrics; endocrinology; hematology/oncology; general surgery.

Summarizing the types of programs eliminated:

- Anesthesia: 2 programs
- Orthopedic surgery: 3 programs
- Pathology: 4 programs
- Podiatry: 1 program
- Rehab medicine: 2 programs
- Cardiology: 2 programs
- Endocrinology: 2 programs

- ob/gyn; pediatrics; radiology; otolaryngology; neurology; ophthalmology; urology; oral surgery; psychiatry; rheumatology; hematology/oncology; general surgery: 1 program each.

It should be noted that these hospitals either had already eliminated some resident programs just prior to the demonstration (e.g., anesthesia) or had never had them in the first place.

5.4 Key Findings

Key findings concerning resident reduction strategies include:

Exhibit 5-2
Key findings resident reduction strategies

Issues	Findings
Participant Reasons for Downsizing	1. Declining volume and less need for residents to provide clinical care 2. Less need for attendings and nurse replacements for residents 3. Fewer patients constrained ability to meet RRC resident patient quotas
Program Size and Specialty Mix	4. High ratio of primary to specialty residents required large percent reductions in specialists and programs 5. Many small specialist programs difficult to downsize 6. Completer hospitals eliminated 54 of 127 specialty programs
Resident Reductions	7. 26 percent reduction in residents in demo’s first 5 years among 7 completers 8. NYC never-participants saw 4 percent increase in residents 9. Surgery, hospital-based, and medical specialty residents reduced the most 10. Primary care residents reduced 19 percent through year 5 11. IMGs reduced 23 percent in first 5 years
Staff Reductions	12. RNs/LPNs fell 10 percent in NYC along with decline in residents, implying no nurse substitutions

SECTION 6
VOLUME AND FINANCIAL PERFORMANCE

6.1 Policy Concerns

This section examines the patient volume and payer mix experience of teaching hospitals in New York State, as well as the resulting impact on their financial performance, from 1995 through 2001. Changes in their patient volumes and financial performance prior to the demonstration (from 1995 to 1997) likely influenced their decision to participate in the demonstration. Similarly, changes in volumes and payer mix during the demonstration (between 1997 and 2001) may have contributed to their decisions to withdraw.

Patient volume, particularly inpatient volume, likely influenced hospitals' participation and withdrawal decisions. A hospital with declining patient volume presumably has less of a need for clinical staff, including residents. Furthermore, Residency Review Committees (RRCs) may require that a hospital scale back, or even eliminate, programs, if residents are unable to meet minimum volumes of different types of cases. As a result, a hospital experiencing volume declines, or anticipating future volume declines, may be more likely to participate in the demonstration. However, a hospital's desire to have a teaching program would temper the decline in its resident demand.

Payer mix (distribution of patients covered by Medicare, Medicaid, managed care plans, or private insurance versus no insurance) is both an indicator for a hospital's importance as a safety net provider as well as helping explain demonstration participation. Hospitals treating relatively large numbers of Medicaid or uninsured patients may be in poorer financial condition, which may have increased their likelihood of participating (and therefore reducing their numbers of residents) in order to receive the demonstration's transition payments.

In addition, because of Medicare payments for teaching hospitals (IME and Direct GME payments), there is a strong relationship between a hospital's Medicare dependency and its financial incentives to participate in the demonstration. The greater a hospital's share of revenues from Medicare, the greater its IME and Direct GME payments per resident. If two hospitals have the same number of residents and patient severity, but one has relatively more Medicare patients than the other, the one with a higher share of Medicare patients will lose more revenue from cutting one resident position than the one with relatively fewer Medicare patients. Since participation in the demonstration required the hospital to maintain its lower resident count for a number of years, the higher a hospital's Medicare dependency, the more IME and Direct GME revenues it is agreeing to forego during that period. Therefore, the greater a hospital's Medicare dependency, the less likely it will be to participate.

In addition to describing determinants of demonstration participation and withdrawal, it is also important to determine whether demonstration-related reductions in clinical staffing (lower numbers of residents) had any impact on patients' access to care. This issue is particularly important for safety-net hospitals, which had a relatively high participation rate in the demonstration. Since changes in their clinical staffing may have large impacts on vulnerable populations, an important policy question is whether any benefits from these hospitals reducing their resident complement outweighs any drawbacks from possible reductions in access to care.

This section is organized as follows: we first identify the data sources in Section 6.2. Then sections 6.3 through 6.6 present summaries of pre- and during-demonstration trends in volume, payer mix, and financial performance based on participation status and geographic locate, and Section 6.7 summarizes the key findings.

6.2 Data Sources and Issues

All of the data presented in this section were extracted from the New York Institutional Cost Reports (NYICRs). The NYICRs are similar to the Medicare Cost Reports (MCRs) in that data on information on volumes, costs, revenues, and expenses. However, the NYICRs collect much more detailed data on the payer—Medicare FFS, Medicaid FFS, Medicare managed care, Medicaid managed care, private FFS insurance, private managed care, other government payers, self-pay, and charity—for the hospital's patients. ***Table 6-1*** gives the NYICR exhibits (worksheets) used as sources of data for this section.

Table 6-1
Data sources for volume and financial summaries

NYICR Exhibit	Data	Equivalent MCR Worksheet
32	Inpatient days and discharges by source of payment	S-3, Part I*
33	Outpatient (ambulatory) visits by source of payment	S-3, Part I*
26A	Statement of revenues and expenses	G-3
23	Balance sheet	G

NOTE:

* Worksheet S-3, Part I of the Medicare Cost Report contains only Medicare (including Medicare Advantage), Medicaid, Maternal and Child Health block grant program, and total volume data. NYICR Exhibits 32 and 33 provide volume data for additional payers.

Revenue, net income, and profit margins were obtained or derived from NYICR Exhibit 26A, while the current ratio and the ratio of long-term debt to total assets were derived from Exhibit 23. Unfortunately, the NYICRs do not contain hospital-specific balance sheet data for New York City Health and Hospitals Corporation (HHC) facilities since most HHC assets and liabilities are held or incurred at the HHC-wide organization level.

6.3 Trends in Overall Hospital Volumes

Three overall inpatient volume measures are summarized in this subsection: the number of patient days, the number of discharges (patients), and the average length of stay (ALOS). ***Table 6-2*** gives the averages of these volume measures for New York teaching hospitals by location and demonstration participation status for 1995, 1997, 1999, and 2001.

Table 6-2
Trends in inpatient discharges, days, and average length of stay (all payers) for New York teaching hospitals, 1995-2001

	Year				Change (Percent)			
Hospital Group	1995	1997	1999	2001	95-97	97-99	99-01	97-01
				Total Inpatient Days				
Continuing Participants	159,452	129,577	108,403	103,891	-18.7 %	-16.3 %	-4.2 %	-19.8 %
Withdrawals								
NYC-Area	212,674	183,768	177,014	178,135	-13.6	-3.7	+0.6	-3.1
Upstate	165,993	140,433	128,089	119,568	-15.4	-8.8	-6.7	-14.9
Non-Participants								
NYC-Area	124,497	119,170	116,829	118,817	-4.3	-2.0	+1.7	-0.3
Upstate	100,532	89,576	85,193	85,873	-10.9	-4.9	+1.0	-4.1
				Total Inpatient Discharges				
Continuing Participants	19,919	18,465	16,750	16,102	-7.3	-9.3	-4.2	-12.8
Withdrawals								
NYC-Area	26,535	26,124	26,263	26,918	-1.5	+0.5	+0.6	+3.0
Upstate	22,430	21,771	21,386	21,210	-2.9	-1.8	-0.8	-2.6
Non-Participants								
NYC-Area	16,557	17,497	18,031	18,789	+5.7	+3.1	+4.2	+7.4
Upstate	14,761	14,370	14,480	14,911	-2.6	+0.8	+3.0	+3.8
				Average Length of Stay				
Continuing Participants	8.0	7.0	6.5	6.5	-12.4	-7.8	-0.4	-8.1
Withdrawals								
NYC-Area	8.0	7.0	6.7	6.6	-12.2	-4.2	-1.8	-5.9
Upstate	7.4	6.5	6.0	5.6	-12.8	-7.1	-5.9	-12.6
Non-Participants								
NYC-Area	7.5	6.8	6.5	6.3	-9.4	-4.9	-2.4	-7.0
Upstate	6.8	6.2	5.9	5.8	-8.8	-4.8	-1.7	-6.5

SOURCE: RTI International analyses of NYICR Exhibit 32, 1995-2001. Program bscott/edrun63 (1/13/2004)

The top panel of Table 6-2 shows the number of all inpatient days in New York teaching hospitals from 1995 through 2001, distinguishing hospitals by participation status and location. The seven hospitals that remained in the demonstration until it ended (Continuing Participants) experienced the largest percentage declines in inpatient days. Prior to the demonstration (from 1995 to 1997), these hospitals' patient day volumes fell by nearly 19 percent, and this decline continued for the first two years of the demonstration (down another 16 percent). From 1999 to 2001 patient day volume continued to fall, but at a much slower rate (down four percent over this period). However, this dramatic decline in patient day volume suggests a much reduced need for clinical staff, including for residents.

With the exception of the upstate Withdrawals (the Buffalo consortium), other teaching hospitals in New York did not experience inpatient day declines nearly as large as those of the Continuing Participants. Prior to the start of the demonstration, the Withdrawals and the Non-Participants did experience lower volume, but the declines were not as severe. Furthermore, with the exception of the upstate Withdrawals, patient day volume steadied and even rose somewhat among other teaching hospitals in the state. In addition, within each geographic area (New York City metropolitan area versus upstate), Non-Participants tended to have greater (less negative) volume growth during the entire six-year period shown than did the Withdrawals, and the Withdrawals had greater (less negative) volume growth than did the Continuing Participants). This association between patient days and participation status is consistent with the participation analysis presented in Section 4; fewer patient days implies reduced need for clinical staff, which makes participation in the demonstration easier.

The growth in patient day volume is determined by the growth in patient (discharge) volume and the growth in ALOS. Trends in these quantities are presented in the second and third panels of Table 6-2. Declining numbers of patients is a cause of poor financial health. In addition, residency programs need to provide residents with a sufficient number and mix of patients to satisfy ACGME and RRC requirements for accreditation. Declining patient volumes suggest a reduced ability to maintain accreditation. In all of the two-year periods shown, both before and during the demonstration, the Continuing Participants had the most negative growth in the number of inpatient discharges. Furthermore, as with patient day volume, there is a monotonic relationship between patient (discharge) volume and participation status, controlling for geographical area. Thus financial condition, in addition to clinical staff needs, may have been an important contributor to participating in, and remaining in, the demonstration.

The bottom panel shows that the trends in ALOS are fairly similar across the five hospital groups. ALOS was generally lower among the upstate hospitals than among the NYC-area hospitals, possibly due to the greater managed care (private and public) penetration in upstate areas than in NYC. However, ALOS seems to be converging among the hospital groups, and there is no clear association between ALOS trends and participation status, unlike for the other volume indicators. Thus the relative differences in volume trends observed for the participation groups seems to be more due to relative differences in the number of patients admitted to the hospitals rather than in differential impacts of payers' negotiated payments after the phasing-out of rate-setting in New York.

To determine whether any inpatient volume declines are the result of some care being shifted to outpatient settings or instead due to poor competitive advantage, ***Table 6-3*** summarizes trends in two outpatient volume measures: clinic (ambulatory, emergency, and psychiatric) visits and ambulatory surgery visits. The top panel of Table 6-3 presents the trends in clinic visits for the five hospital groups. Prior to the demonstration (1995 to 1997), hospitals in all five of the participation/geography groups experienced increases in clinic visits. However, Continuing Participants' average increase in clinic volume over this period was only 1.1 percent, compared to between 13 and 23 percent for the other hospitals. Furthermore, they were the only hospital group to experience an overall decline (down 4.5 percent) in clinic volume during the first four years of the demonstration. Thus the dramatic inpatient volume declines that Continuing Participants experienced (shown in Table 6-2) do not seem to be due to shifting to outpatient settings but rather to overall declines in the number of people seen in either venue. On the other hand, the Withdrawals and Non-Participants did experience increases in overall patient volume. However, clinic visits are generally not very profitable. As a result, the clinic volume increases among the Withdrawals and Non-Participants may not improve the hospitals' financial condition.

Table 6-3
Trends in outpatient clinic and ambulatory surgery visits (all payers) for New York teaching hospitals, 1995-2001

	Year				Change (Percent)			
Hospital Group	1995	1997	1999	2001	95-97	97-99	99-01	97-01
				Total Clinic Visits				
Continuing Participants	366,823	370,759	345,240	354,166	+1.1 %	-6.9 %	+2.6 %	-4.5 %
Withdrawals								
NYC-Area	410,165	476,467	500,624	510,082	+16.2	+5.1	+1.9	+7.1
Upstate	405,066	477,258	437,202	478,283	+17.8	-8.4	+9.4	+0.2
Non-Participants								
NYC-Area	201,771	247,861	254,411	248,688	+22.8	+2.6	-2.2	+0.3
Upstate	228,546	258,324	272,812	272,033	+13.0	+5.6	-0.3	+5.3
				Ambulatory Surgery Visits				
Continuing Participants	3,459	4,067	2,678	3,943	+17.6	-34.2	+47.2	-3.0
Withdrawals								
NYC-Area	8,363	11,069	12,915	13,718	+32.4	+16.7	+6.2	+23.9
Upstate	10,357	12,859	13,038	15,054	+24.2	+1.4	+15.5	+17.1
Non-Participants								
NYC-Area	6,287	7,896	8,948	10,312	+25.6	+13.3	+15.2	+30.6
Upstate	6,099	7,780	8,457	9,875	+27.6	+8.7	+16.8	+26.9

SOURCE: RTI International analyses of NYICR Exhibit 33, 1995-2001. Program bscott/edrun63 (1/13/2004)

The bottom panel of Table 6-3 presents trends in outpatient surgery volumes before and during the demonstration. Not surprisingly, the volumes for this relatively profitable service rose more than for other outpatient visits both before and during the demonstration. Just as for inpatient and other outpatient volumes, the continuing participants had the slowest growing pre- and during-demonstration outpatient surgery volumes among the five groups. In fact, their average number of outpatient surgery visits actually fell somewhat (down 3.0 percent) during the demonstration, in contrast to the 17 to 30 percent increases for the Withdrawals and Non-Participants during this period.[27]

A summary measure of the trends in overall hospital volume, based on the sum of two components, inpatient discharges plus "inpatient-equivalent" outpatient volume, is shown in ***Table 6-4***. We define "inpatient-equivalent" outpatient volume to be equal to the number of ambulatory surgery visits plus one-tenth of the number of other outpatient visits (clinic, emergency, and psychiatric), assuming that there is a 10:1 ratio of staffing need for inpatient discharges relative to outpatient visits. The Continuing Participants are the only group of New York teaching hospitals for which this overall volume measure declines both before (from 1995 to 1999) and during (from 1997 to 2001) the demonstration. Prior to the demonstration, the other four teaching hospital groups experienced a ten percent or higher increase in volume in contrast to the Continuing Participants' average –0.8 percent decline. During the demonstration, while the Continuing Participants experienced a seven percent decline in volume, the other teaching hospitals had a nearly eight percent increase (the Upstate Withdrawals, the Buffalo Consortium, was the exception with a 2.1 percent increase). There is no discernable relationship between participation status and volume changes except that Continuing Participants experienced overall volume declines while the other hospitals did not.

Table 6-4
Trends in inpatient plus outpatient "inpatient-equivalent" volume for New York teaching hospitals, 1995-2001

	Year				Change (Percent)			
Hospital Group	1995	1997	1999	2001	95-97	97-99	99-01	97-01
Continuing Participants	60,060	59,608	53,952	55,462	-0.8 %	-9.5 %	+2.8 %	-7.0 %
Withdrawals								
NYC-Area	75,915	84,839	89,240	91,644	+11.8	+5.2	+2.7	+8.0
Upstate	73,294	82,356	78,144	84,092	+12.4	-5.1	+7.6	+2.1
Non-Participants								
NYC-Area	43,021	50,179	52,420	53,970	+16.6	+4.5	+3.0	+7.6
Upstate	43,715	47,982	50,218	51,989	+9.8	+4.7	+3.5	+8.4

NOTE:
Outpatient "equivalent volume" computed as the number of ambulatory surgery visits plus one-tenth of the number of clinic visits.

SOURCE: RTI International analyses of NYICR Exhibits 32 and 33, 1995-2001. Program bscott/edrun63 (1/13/2004).

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[27] The large (34 percent) decline in reported outpatient surgery visits for Continuing Participants from 1997 to 1999, followed by a large (47 percent) increase from 1999 to 2001 may indicate a reporting problem for these hospitals in 1999. We therefore focus on the four-year demonstration trend from 1997 to 2001.

6.4 Trends in Inpatient Payer Mix

Table 6-5 presents trends in the share of inpatient days and uncompensated care (charity and free care as well as self-pay) for three payers—Medicare, Medicaid, and managed care. Patient day shares for non-managed private insurance and other public insurance programs (e.g., Workers' Compensation) are not shown and were quite small compared to the shares of these other payers. Each panel of this table displays the proportions of inpatient days in the five hospital groups for each payer type. Changes in the payer shares in percentage points (not percent changes) are shown in the four rightmost columns.

Table 6-5
Trends in inpatient payer mix for New York teaching hospitals, 1995-2001

	Year				Change (Percentage Points)			
Hospital Group	1995	1997	1999	2001	95-97	97-99	99-01	97-01
				Medicare FFS Day Share				
Continuing Participants	22.5 %	22.0 %	22.6 %	22.1 %	-0.5	+0.6	-0.5	-0.4
Withdrawals								
NYC-Area	34.4	34.3	32.7	31.5	-0.1	-1.6	-1.2	-2.9
Upstate	44.3	44.1	39.7	36.9	-0.2	-4.4	-0.3	-4.7
Non-Participants								
NYC-Area	43.5	41.3	38.5	38.3	-2.2	-2.8	-0.2	-3.0
Upstate	48.1	47.4	46.1	45.5	-0.7	-1.3	-0.6	-1.9
				Medicaid FFS Day Share				
Continuing Participants	56.6	55.9	52.4	55.4	-0.7	-3.5	+3.0	-0.5
Withdrawals								
NYC-Area	38.4	36.9	33.3	35.3	-1.5	-3.6	+2.0	-1.6
Upstate	21.0	17.4	17.3	12.0	-3.6	-0.1	-5.3	-5.4
Non-Participants								
NYC-Area	24.0	23.2	22.5	22.9	-0.8	-0.7	+0.4	-0.3
Upstate	15.1	14.4	13.1	13.6	-0.7	-1.3	+0.5	-0.8
				Managed Care Day Share				
Continuing Participants	6.5	9.7	13.1	13.7	+3.2	+3.4	+0.6	+4.0
Withdrawals								
NYC-Area	7.2	14.0	20.1	21.5	+6.8	+6.1	+1.4	+7.5
Upstate	15.4	21.3	27.1	38.3	+5.9	+5.8	+11.2	+17.0
Non-Participants								
NYC-Area	9.3	15.9	21.4	22.5	+6.6	+5.5	+1.1	+6.6
Upstate	16.2	17.7	20.7	20.1	+1.5	+3.0	-0.6	+2.4
				Uninsured (Self-Pay and Charity) Day Share				
Continuing Participants	10.6	9.2	9.4	6.5	-1.4	+0.2	-2.9	-2.7
Withdrawals								
NYC-Area	5.2	4.5	5.3	3.8	-0.7	+0.8	-1.5	-0.7
Upstate	2.8	2.8	2.9	2.8	0.0	+0.1	-0.1	0.0
Non-Participants								
NYC-Area	4.0	3.7	4.0	2.8	-0.3	+0.3	-1.2	-0.9
Upstate	3.0	4.0	3.9	2.9	+1.0	-0.1	-1.0	-1.1

SOURCE: RTI International analyses of NYICR Exhibit 32, 1995-2001. Programs bscott/edrun65 (1/14/2004) and bscott/edrun70 (4/5/2005)

In general, the Continuing Participants had the lowest Medicare fee-for-service (FFS) and managed care day shares and the highest Medicaid and uninsured day shares of all five of the teaching hospital groups before and during the demonstration. Their Medicaid FFS day shares are generally nearly 20 percentage points higher than the group with the next-highest Medicaid FFS day share, the NYC-area Withdrawals (52.4 to 56.6 percent versus 33.3 to 38.4 percent). Their uninsured day shares were also approximately double those of the NYC-area Withdrawals. The Continuing Participants are clearly all safety-net providers.

As shown in the top panel of Table 6-4, there is a monotonic relationship between participation status and Medicare FFS day shares within each geographic area. The Continuing Participants had the smallest Medicare day shares in 1995, prior to the demonstration (22.5 percent, versus at least 34.4 percent for other teaching hospitals). Furthermore, the Withdrawals had lower pre-demonstration Medicare day shares than the Non-Participants in their geographic areas (34.4 percent versus 43.5 percent in the New York City area; 44.3 percent versus 48.1 percent in upstate New York). This relationship continued during the first four years of the demonstration.

Over the six-year period shown in Table 6-5, the Medicare and Medicaid FFS day shares in New York City-area hospitals were relatively constant. Medicaid managed care penetration into New York City was delayed during this period, which may also have slowed the penetration of Medicare+Choice plans. However, there is a large increase in the proportion of days covered by managed care and a reduction in uninsured days among the New York City teaching hospitals. New York's economy in the late 1990s was quite strong, and it is likely that many people who had been self-pay received coverage through an employer or a public insurance expansion (e.g., Medicaid 1115 waiver). Since Medicaid FFS day shares were relatively steady, it is unlikely that hospitals were systematically avoiding poor patients (avoiding the poor would presumably reduce Medicaid volume). The increase in managed care penetration is therefore likely due to conversion of private insurance to managed care and coverage of some of the previously uninsured.

Managed care penetration in upstate areas was generally higher than in New York City, particularly prior to the demonstration. At least part of this was likely the result of an earlier roll-out of managed Medicaid in these areas. This was particularly the case in Buffalo, where the Upstate Withdrawals are located. Not only was managed care penetration high prior to the demonstration, but also had the most rapid penetration growth. By 2001, nearly 40 percent of days in the Buffalo Consortium were covered by managed care plans, suggesting that these hospitals were under particularly strong financial pressure.

There was a significant decline in the uninsured inpatient day shares in teaching hospitals in New York, particularly among patients in hospitals participating in the demonstration for the full six years. This implies that resident reductions among demonstration participants did not result in restricting access to the uninsured.

6.5 Decomposition of Uninsured Volumes

In this subsection we first separate inpatient volume into four components—acute inpatient, newborn, psychiatric inpatient, and other—and present uninsured day shares for each.

We then examine the share of ambulatory clinic, emergency, and psychiatric clinic visits attributable to uninsured patients.

Table 6-6 gives the inpatient uninsured volume trends for the pre- and during-demonstration periods. The Continuing Participants generally have the greatest shares of uninsured cases among the five participation groups. The difference between these and the other hospitals is greatest for acute inpatient care as well as for other inpatient (e.g., rehabilitation) services. In these two categories, Continuing Participants' uninsured shares are generally double those of the other hospitals. The differences in uninsured inpatient psychiatric and newborn day shares are smaller, perhaps because of the generally less voluntary nature of these admissions.

Table 6-6
Trends in uninsured inpatient day shares in four inpatient service types for New York teaching hospitals, 1995-2001

	Year				Change (Percentage Points)			
Hospital Group	1995	1997	1999	2001	95-97	97-99	99-01	97-01
				Acute Inpatient Uninsured Day Share				
Continuing Participants	10.4 %	9.3 %	10.0 %	6.4 %	-1.1	+0.7	-3.6	-2.9
Withdrawals								
NYC-Area	4.7	4.0	5.0	3.6	-0.7	+1.0	-1.4	-0.4
Upstate	2.1	2.1	1.8	1.0	0.0	-0.3	-0.8	-1.1
Non-Participants								
NYC-Area	3.8	3.5	3.8	2.8	-0.3	+0.3	-1.0	-0.7
Upstate	2.4	3.1	3.4	2.5	+0.7	+0.3	-0.9	-0.6
				Inpatient Newborn Uninsured Day Share				
Continuing Participants	8.1	7.6	8.7	4.1	-0.5	+1.1	-4.6	-3.5
Withdrawals								
NYC-Area	7.1	6.5	5.9	3.6	-0.6	-0.6	-2.3	-2.9
Upstate	7.9	9.0	9.9	2.0	+1.1	+0.9	-7.9	-7.0
Non-Participants								
NYC-Area	9.1	8.0	6.5	2.9	-1.1	-1.5	-3.6	-5.1
Upstate	5.6	10.3	7.4	6.0	+4.7	-2.9	-1.4	-4.3
				Inpatient Psychiatric Uninsured Day Share				
Continuing Participants	13.3	9.2	8.7	7.7	-4.1	-0.5	-1.0	-1.5
Withdrawals								
NYC-Area	8.6	7.0	7.3	5.5	-1.6	+0.3	-1.8	-1.5
Upstate	6.3	5.6	7.9	3.8	-0.7	+2.3	-4.1	-1.8
Non-Participants								
NYC-Area	5.2	5.1	6.1	4.4	-0.1	+1.0	-1.7	-0.7
Upstate	6.8	8.6	8.3	6.4	+1.8	-0.3	-1.9	-2.2
				Other Inpatient Uninsured Day Share				
Continuing Participants	8.2	7.0	5.4	5.3	-1.2	-1.6	-0.1	-1.7
Withdrawals								
NYC-Area	3.3	2.8	3.2	2.0	-0.5	+0.4	-1.2	-0.8
Upstate	2.5	2.3	2.8	4.0	-0.2	+0.5	+1.2	+1.7
Non-Participants								
NYC-Area	2.8	1.9	2.2	1.3	-0.9	+0.3	-0.9	-0.6
Upstate	6.9	7.0	3.2	1.5	+0.1	-3.8	-1.7	-5.5

SOURCE: RTI International analyses of NYICR Exhibit 32, 1995-2001. Program bscott/edrun65 (1/14/2004) and bscott/edrun70 (4/5/2005)

Table 6-6 also shows declining uninsured day shares during the demonstration among the four service groups. Uninsured day shares fell particularly for newborn care, possibly reflecting increased public insurance for these cases. In addition, there do not seem to be any systematic differences in the reduction in uninsured inpatient day shares across the five hospital groups, suggesting that any resident reductions from hospitals participating in the demonstration did not have any measurable effect on access to inpatient care for the uninsured.

Table 6-7 shows trends in outpatient care provided to uninsured patients, separating outpatient departments into ambulatory clinics, emergency care, and ambulatory surgery. The proportion of outpatient care provided to uninsured patients is notably higher than for inpatient care. Furthermore, in all three outpatient care categories, the Continuing Participants' uninsured outpatient shares were higher than for other hospital groups, particularly for ambulatory clinics.

Table 6-7
Trends in uninsured outpatient day shares in three outpatient service types for New York teaching hospitals, 1995-2001

	Year				Change (Percentage Points)			
Hospital Group	1995	1997	1999	2001	95-97	97-99	99-01	97-01
Clinic Visit Uninsured Share								
Continuing Participants	31.7 %	29.1 %	29.1 %	30.1 %	-2.6	0.0	+1.0	+1.0
Withdrawals								
NYC-Area	27.6	23.5	24.4	22.7	-4.1	+0.9	-1.7	-0.8
Upstate	6.0	6.1	6.9	4.4	+0.1	+0.8	-2.5	-1.7
Non-Participants								
NYC-Area	15.3	11.3	12.8	10.4	-4.0	+1.5	-2.4	-1.9
Upstate	8.0	7.3	8.3	7.3	-0.7	+1.0	-1.0	0.0
Emergency Visit Uninsured Share								
Continuing Participants	41.0	41.7	39.5	34.9	+0.7	-2.2	-4.6	-6.8
Withdrawals								
NYC-Area	40.4	30.9	32.7	30.3	-9.5	+1.8	-2.4	-0.6
Upstate	11.5	10.8	11.8	8.0	-0.7	+1.0	-3.8	-2.8
Non-Participants								
NYC-Area	25.9	23.6	22.2	18.6	-2.3	-1.4	-3.6	-5.0
Upstate	14.2	15.7	16.1	15.6	+1.5	+0.4	-0.5	-0.1
Psychiatric Visit Uninsured Share								
Continuing Participants	20.0	18.0	24.3	19.3	-2.0	+6.3	-5.0	+1.3
Withdrawals								
NYC-Area	17.8	13.0	13.0	16.7	-4.8	0.0	+3.7	+3.7
Upstate	13.0	15.8	13.9	8.9	+2.8	-1.9	-5.0	-6.9
Non-Participants								
NYC-Area	17.4	13.8	17.6	16.5	-3.6	+3.8	-1.1	+2.7
Upstate	13.4	13.8	14.8	12.6	+0.4	+1.0	-2.2	-1.2

SOURCE: RTI International analyses of NYICR Exhibit 33, 1995-2001. Program bscott/edrun65 (1/14/2004)

The Continuing Participants also saw the share of uninsured patients in their ambulatory and psychiatric clinics rise during the demonstration. This further suggests that hospitals' participation in the demonstration did not reduce access to care for the uninsured. The share of the uninsured in hospitals' emergency departments did fall, particularly for the Continuing Participants (down 6.8 percent during the demonstration). However, the emergency visit uninsured shares fell for all hospitals during the demonstration period (1997 to 1999). Rather than being caused by demonstration participation, this is likely due to the expansion of coverage (public or private) that occurred at the same time during the economic expansion of the 1990s.

6.6 Trends in Financial Performance

One measure of a hospital's financial condition is its revenue growth. Because of fixed costs, it is very difficult for a hospital to improve its finances if revenues are flat or decline since it can be difficult to reduce cost growth proportionately. ***Table 6-8*** presents trends in net patient revenues and net patient revenues per inpatient-equivalent unit of volume.

Table 6-8
Trends in net patient revenue[1] for New York teaching hospitals, 1995-2001

	Year				Change (Percent)			
Hospital Group	1995	1997	1999	2001	95-97	97-99	99-01	97-01
			Average Net Patient Revenue ($ millions)					
Continuing Participants	$ 225.7	$ 209.8	$ 204.4	$ 209.6	-7.0 %	-2.6 %	+2.6 %	-0.1 %
Withdrawals								
NYC-Area	320.9	329.4	343.9	366.1	+2.6	+4.4	+6.5	+11.2
Upstate	180.5	178.4	183.1	194.3	-1.1	+2.6	+6.2	+8.9
Non-Participants								
NYC-Area	159.6	189.6	198.0	233.8	+18.8	+4.4	+18.1	+23.3
Upstate	125.6	135.1	144.4	165.3	+7.6	+6.9	+14.5	+22.3
			Net Patient Revenue per Inpatient-Equivalent Discharge[2]					
Continuing Participants	$ 3,757	$ 3,519	$ 3,788	$ 3,780	-6.3	+7.6	-0.2 %	+7.4 %
Withdrawals								
NYC-Area	4,228	3,882	3,854	3,995	-8.2	-0.7	+3.7	+2.9
Upstate	2,462	2,167	2,343	2,311	-12.0	+8.1	-1.4	+6.7
Non-Participants								
NYC-Area	3,710	3,779	3,777	4,332	+1.9	-0.1	+14.7	+14.7
Upstate	2,873	2,817	2,876	3,180	-2.0	+2.1	+10.6	+12.9

NOTE:

[1] Charges less contractual allowances and bad debts.

[2] Inpatient discharges plus one-tenth of outpatient volumes.

SOURCE: RTI International analyses of NYICR Exhibit 26A, 1995-2001. Program bscott/exc200 (2/3/2004)

As shown in the top panel of Table 6-8, prior to the start of the demonstration, there were two groups of hospitals with declining overall net patient revenues: the Continuing Participants and the Upstate Withdrawals. These were the hospitals with the lowest (most negative) inpatient volume growth (see Table 6-2), which presumably contributed to the decline in total net patient revenues. During the demonstration (from 1997 to 2001), the Continuing Participants' net patient revenues were generally flat, while those of the other teaching hospital groups rose by nine percent or more.

The bottom panel of Table 6-8 divides average net patient revenue by the inpatient-equivalent volume measure shown in Table 6-3 (the sum of inpatient discharges, ambulatory surgery visits, and one-tenth of the number of other outpatient visits). For most New York teaching hospitals, with the exception of the Continuing Participants, pre-demonstration growth rates of net patient revenues per inpatient-equivalent discharge were lower (more negative) than that of total net patient revenues. This is due to rising outpatient volumes among these hospitals, which would tend to reduce revenues per unit of volume. However, because Continuing Participants did not have as significant a shift in the site of care from inpatient to outpatient settings, their revenues per adjusted admission declined at a rate similar to total net patient revenues. Furthermore, the relatively slow growth of net patient revenue per adjusted admission among hospitals not remaining in the demonstration continued throughout the first four years of the demonstration.

Table 6-9 presents three additional measures of financial performance. The operating margin (the percent excess of operating revenues over operating expenses) is a measure of a hospital's success in covering its patient care costs. The net total margin (the percent excess of net total revenues over total expenses) includes the impact of hospitals' revenue-producing non-operating activities (investment income, property leases, parking revenues, etc.) and is generally higher than operating margins unless losses on related businesses or investments are realized. The current ratio divides current assets by current liabilities and is therefore a measure of the ability of a hospital to finance its immediate cash needs.[28]

Over the course of the demonstration, the financial performance of New York teaching hospitals generally declined, particularly their operating margins. In particular, the hospitals with decreases in inpatient discharges and ALOS (the Continuing Participants and the Upstate Withdrawals) experienced the largest decline in operating margins. Since hospitals have significant fixed costs, large volume declines will produce significant erosion in operating margins even if the revenue per unit of volume rises somewhat. Basically, their per-unit revenues did not rise enough to cover cost increases. Most hospitals were able to offset some operating margin erosion with profitable non-operating activities. However, by 2001, teaching hospitals in New York on average had negative operating and total margins.

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[28] Because HHC does not report balance sheet data for individual facilities in the NYICRs, the current ratio calculations omit all HHC facilities.

Table 6-9
Trends in operating margins and current ratios for New York teaching hospitals, 1995-2001

	Year				Change (Percentage Points)			
Hospital Group	1995	1997	1999	2001	95-97	97-99	99-01	97-01
				Net Operating Margin				
Continuing Participants	-4.3 %	0.5 %	0.6 %	-4.8 %	+4.7	+0.1	-5.4	-5.3
Withdrawals								
NYC-Area	-1.2	1.3	-0.6	-1.0	+2.5	-1.9	-0.4	-2.3
Upstate	-2.0	0.2	-3.2	-5.8	+2.2	-3.4	-2.6	-6.0
Non-Participants								
NYC-Area	1.0	1.2	-4.1	-1.2	+0.2	-5.5	+2.9	-2.4
Upstate	1.2	2.5	-3.3	-0.7	+1.3	-5.8	+2.6	-3.1
				Net Total Margin				
Continuing Participants	-4.7 %	0.5 %	0.9 %	-5.1 %	+4.9	+0.4	-6.0	-5.8
Withdrawals								
NYC-Area	-1.2	1.8	0.4	-0.2	+3.0	-1.3	-0.7	-2.0
Upstate	-1.8	-0.2	-2.9	-5.6	+1.6	-2.7	-2.7	-5.4
Non-Participants								
NYC-Area	1.8	1.4	-2.7	-0.5	+0.2	-5.5	+3.1	-2.4
Upstate	1.7	2.6	-3.3	-1.0	+0.9	-5.9	+2.3	-3.6
				Current Ratio (Current Assets to Current Liabilities)				
Continuing Participants	0.83	0.91	0.96	1.01	+0.80	+0.05	+0.05	+0.10
Withdrawals								
NYC-Area	1.33	1.33	1.31	1.26	0.00	-0.02	-0.05	-0.07
Upstate	1.05	1.05	1.26	1.00	0.00	+0.21	-0.26	-0.05
Non-Participants								
NYC-Area	1.40	1.32	1.26	1.20	-0.08	-0.06	-0.06	-0.12
Upstate	1.34	1.53	1.36	1.25	+0.19	-0.17	-0.11	-0.28

SOURCE: RTI International analyses of NYICR Exhibits 23 and 26A, 1995-2001. Program bscott/exc200 (2/3/2004)

The third panel of Table 6-9 shows that the erosion in total margins among teaching hospitals in New York was generally mirrored in their reduced ability to cover short-term liabilities with cash and cash equivalents, as indicated by declining current ratios. Interestingly, the only hospitals able to improve their current ratios were the two non-HHC Continuing Participants. However, these hospitals began the demonstration with a current ratio below 1.0, indicating extreme cash flow difficulties; by the end of the demonstration, they were able to boost average current assets slightly above current liabilities. Furthermore, the hospitals that had ever participated in the demonstration had lower current ratios than those that did not participate.

6.7 Summary of Findings

The findings in this section demonstrate that there were significant differences in volume, casemix, and financial trends between Continuing Participants and the other New York teaching hospitals, with more subtle differences between Withdrawals and Non-Participants. ***Exhibit 6-1*** summarizes the key points.

Exhibit 6-1
Key volume and financial trend findings

Characteristic	Pre-Demonstration	During Demonstration
Inpatient Volume	• Declining (-7 percent) discharges for Continuing Participants; much smaller, if any, declines for other hospitals. • ALOS declines similar (-9 to -12 percent) across all hospital types and drive the majority of inpatient day declines.	• Continuing Participants were the only group with declining discharges during the demo period. • ALOS continued to fall for all hospitals, with no clear association with participation status.
Outpatient Volume	• Continuing Participants had slowest growth in outpatient volume, both in clinics and in outpatient surgery. • Little difference in outpatient volume growth for Withdrawals versus Non-Participants.	• Outpatient volume growth generally slower during the demonstration than before it began. • Continuing Participants had negative clinic and outpatient surgery volume growth, unlike other hospitals. • Little difference in outpatient volume growth for Withdrawals versus Non-Participants.
Payer Mix	• Continuing Participants had the lowest Medicare FFS and managed care shares, and the highest Medicaid and uninsured shares. • Hold geographic area fixed, there was a monotonic relationship between participation status and Medicare day share. • Small declines in Medicare FFS, Medicaid FFS, and uninsured day shares; increases in managed care day shares.	• Pre-demonstration payer mix patterns persisted during the demonstration. • Medicare FFS and Medicaid FFS day shares were relatively constant. • Uninsured day shares fell for all hospital groups. • Continuing Participants' uninsured shares remained double those of the other hospitals. • Managed care day shares rose significantly.
Financial Condition	• Net patient revenue, in total and per unit of inpatient-equivalent volume, fell for Continuing Participants. • For the other teaching hospitals, total net patient revenue generally rose, but only NYC-Area Non-Participants saw their net patient revenues per unit of inpatient-equivalent volume rise. • Net operating and total margins were mostly positive in 1997, at the start of the demonstration. • Continuing participants had current liabilities exceeding current assets, suggesting severe cash needs. Non-participants had the best (though not very good) ability to cover current liabilities.	• Only Continuing Participants experienced flat net patient revenue growth. • Continuing Participants' growth of net patient revenue per inpatient-equivalent volume was higher than Withdrawals' (but lower than Non-Participants'), possibly due to less shifting of care from inpatient to outpatient settings. • By 2001, all hospitals had negative operating and total margins. Continuing Participants had lower margins than most other hospitals. • Continuing Participants' current asset position improved, while that of Withdrawals and Non-Participants worsened.

Consistent with the participation analysis presented earlier (in Section 4 of this report), volume trends differ systematically between Continuing Participants, Withdrawals, and Non-Participants. The hospitals that participated in the demonstration (Continuing Participants and Withdrawals) had more negative volume trends prior to the demonstration. Furthermore, whereas inpatient volumes for Withdrawals and Non-Participants stabilized during the demonstration, those for the Continuing Participants continued to fall. In addition, Continuing Participants' outpatient volumes, both clinic (ambulatory, emergency, and psychiatric) and ambulatory surgery, grew substantially slower than for the other hospitals. Thus the clinical need for residents and the ability to provide a sufficient number and mix of cases seem to have been important factors in teaching hospitals' decisions to participate in the demonstration.

Both prior to and during the first four years of the demonstration, the Continuing Participants treated a greater proportion of poor and uninsured patients in all inpatient and outpatient services than did the Withdrawals and the Non-Participants. In New York City, the Withdrawals treated a poorer and more uninsured casemix than did the Non-Participants.[29] Thus safety net hospitals were disproportionately more likely to participate in and remain in the demonstration. During the demonstration, the share of the Continuing Participants' patients who were uninsured fell by one-quarter to one-third. However, the share of uninsured patients among the other teaching hospitals' patients fell as well. This suggests that the decline in the uninsured shares is more likely due to the improving economic conditions during this period (so the number of uninsured fell) rather than to any demonstration participation-induced reduction in access to care for these patients.

Pre-demonstration financial condition seems to be associated with demonstration participation and the likelihood of remaining in the demonstration until it ended in 2003. In 1995, prior to the start of the demonstration, the Continuing Participants had the most negative operating and total margins and the lowest current ratio (in fact below 1.0, indicating a very limited ability to meet current obligations). In contrast, the Non-Participants were the only group with positive operating and total margins in 1995, and they had the highest current ratios. Furthermore, the Continuing Participants had significantly negative growth in total net patient revenue.

During the demonstration, the relationship between financial performance and demonstration participation status was mixed. Continuing Participants were the only hospital group with flat patient revenues during this period, they had the largest drop in total margins, and their current ratios continued to be quite low. However, they did have an increase in patient revenues per unit of inpatient-equivalent volume (presumably because of low outpatient volume growth, in contrast to the greater shift from inpatient to outpatient care among other hospitals). The Withdrawals and Non-Participants also experienced significant reductions in operating and total margins, and the current ratios of these hospitals fell (a convergence in the current ratios for all New York teaching hospitals). Thus during-demonstration financial performance was not generally a predictor of withdrawal from the demonstration

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[29] Due to the geographic clustering of demonstration participants in upstate New York (all were in Buffalo), comparisons of casemix in Withdrawals versus Non-Participants in that area are difficult because we cannot control for differences in the proportion of the residents of those areas who are Medicaid beneficiaries or are uninsured.

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SECTION 7
IMPACTS ON ACCESS TO CARE OF THE NEW YORK GME DEMONSTRATION

7.1 Introduction

A reduction in residents in New York State teaching hospitals may affect access to care either negatively or positively depending on the number, specialty, and type of personnel used to replace lost positions and how quickly the substitutions take place. Of particular concern are the "safety-net" hospitals in New York City that serve a large proportion of the poor in both Medicaid and uninsured/charity cases (DeLia et al., 2001). Most of these safety-net hospitals are operated by the city's Health and Hospitals Corporation (HHC), which has limited funds available to substitute resident positions with nurse practitioners or other more highly skilled staff.

In theory, residents do not provide direct patient care. In practice, however, they often play a major role in caring for patients; for instance, residents on the night shift may substitute for attending physicians. Residents in the medical specialties are particularly critical, as they are responsible for the critical night time needs not only of medical patients, but also of post-operative surgical patients. Attending physicians are on-call, but will not be the first physicians at patients' bedsides in case of emergency. A Resident often is the first physician to see patients in emergency rooms. They also often serve as primary care providers in hospitals' outpatient clinics. In fact, Resident Review Committees now mandate that residents spend a proportion of their training period in the primary care setting.

During the course of the demonstration, the reduction in resident counts varied across specialties, with the greatest declines in OB/GYN, medical subspecialties (pulmonary, cardiology), surgery (thoracic, orthopedic), dental, psychiatry, and radiology, anesthesiology and pathology (RAPs) (Cromwell et al., 2001). These reductions may have resulted in attending physicians, nurses, and other clinicians spending more time with patients, with no change, or even an improvement, in access to quality care. In other instances, additional staff may have been hired to replace lost residents. Conversely, fewer residents could have overburdened the remaining staff and resulted in diminished access to needed care – especially involving physicians. Demonstration hospitals may have adopted alternative ways to reconfigure their services to mitigate any potential negative impacts on access to care.

This section addresses the following access-related questions:

- Were hospital volumes maintained during the demonstration? If not, which hospitals were adversely affected? Where volumes declined, could any of the reduction be attributed to the reduction in residents?

- Did the volume of Medicaid or charity care change?

- Were there changes in the volume of critical services, such as trauma and delivery?

- What are the impacts on access to care from the community perspective over the demonstration period?

7.2 Contextual Environment

At the same time that the CMS demonstration was being implemented, health care in New York experienced dramatic changes, especially in New York City. These changes in hospital budgeting and fiscal policy may have affected access to care at all hospitals, but particularly at HHC hospitals that represent five of the seven continuing participants. HHC hospitals faced a decline in all sources of public funding, forcing them to limit the services they provided (Martinez, *Currents: Medicaid Managed Care*, 2002). There have been sizable staff reductions (far beyond any resident reductions) and consolidation of services throughout the HHC service network with consequent longer waits for outpatient appointments and in Emergency Rooms (ER). These effects largely impacted HHC's low-income and uninsured constituents, often immigrants and people of color. In addition, HHC hospitals have had to adjust to mandatory Medicaid managed care in the late 1990s that reduced the need for hospital beds. HHC hospitals in the City eliminated 2,871 beds since 1992 (*HHC Trends: Bed Complement*, 2002).

Increased competition among hospitals may also explain changes in patient care access. Between 1995 and 1999, 10 non-HHC hospitals in New York City received Medicaid enriched payments under the state's Products of Ambulatory Care Program (PAC). The program was established to encourage hospitals to increase clinic visits to encourage quality and continuity of care. Under PAC, participating hospitals received outpatient reimbursement that averaged $140 per visit versus $80 per visit under the regular Medicaid program. Higher payments encouraged hospitals to compete more aggressively for Medicaid patients. Consequently, HHC hospitals located near competitors receiving enriched payments had a negative (median) growth rate in clinic visits of 1.1 percent compared to a 4.4 percent increase in other HHC hospitals (Martinez, *Hospital Watch,* 2002).

There were other systemic changes in HHC hospitals that may have influenced patient care. In March of 1996, New York City's Emergency Medical System (EMS) was transferred from HHC to the fire department. This led to a reduction of 17,000 HHC ambulance transports in 1999, which probably contributed to the decline in HHC facility discharges during the same period (Martinez, *Hospital Watch,* 2002). Furthermore, in 1997, HHC attending affiliation contracts with local medical schools were renegotiated which resulted in an increase in the number of hours worked on-site by attending physicians. Additionally, there has been a recent effort to systematize the clinical appointment system in an effort to reduce inefficiencies in HHC hospitals. Isolating the effects of resident reductions from any effects these other changes may have had on access is a considerable challenge.

7.3 Methods

In our analysis, New York demonstration hospitals were compared with hospitals that never participated in the demonstration and those that withdrew. We performed both quantitative and qualitative analyses of the demonstration impact on access. The quantitative measures were based on claims data obtained for New York State. The qualitative assessment was based on information obtained from interviews with key community providers and advocates.

7.3.1 Data Sources

New York State’s uniform hospital discharge dataset Statewide Planning and Research Cooperative System (SPARCS) was utilized to perform a pre/post comparison between the hospitals in the demonstration versus those who did not participate. The SPARCS data system contains claims for inpatient stays and outpatient ambulatory surgery visits. Notably, the data only include visits to a hospital outpatient department if a procedure was performed. No information on services provided at community or outreach clinics is available in SPARCS. There are 15 ICD-9 diagnosis and procedure codes on inpatient claims, and 6 codes in the outpatient file. There is one record per discharge or visit.

7.3.2 Quantitative Methods

To better understand the performance of hospitals still in the demonstration, we compare them to both initial participants who withdrew and to non-participants. Participation in the New York GME Demonstration is voluntary. Furthermore, participants had the option of withdrawing during the demonstration period. Our previous analysis indicates some selection bias in the decision to withdraw from the demonstration (Cromwell et al., 2001). Participants who remain in the demonstration have had larger declines in inpatient volumes than have other New York City-area teaching hospitals. The New York City area hospitals with the largest volume of outpatient clinics, emergency rooms, and mental health services also either withdrew or never participated in the demonstration.

Hospitals are categorized according to their demonstration status as of September 30, 2002: (1) continuing in the demonstration; (2) withdrawn; or (3) non-participants. Hospitals that participated in the demonstration for less than 6 months were considered non-participants. Hospitals are further grouped by New York City and its suburbs or an upstate location.

We took particular care to identify hospitals that merged after the start of the demonstration. For merged hospitals, we treat their separate facilities as one combined entity for the 1995, 1997, 1999, and 2001 time periods. In addition, we combined discharges from all locations associated with a particular institution. This is required since often each location is reported separately in the claims files under different identifiers.

Differences between continuing participants, withdrawals, and non-participants are compared between the pre-demonstration and post-demonstration timeframe (study period was 1995-2001). Benchmarking participant changes against non-participants partially controls for the effects of confounding factors. The definition of the hospital subgroups and the sample size are indicated in ***Table 7-1***. No statistical tests are performed because too few hospitals (7) completed the demonstration. They are also a very select group, as shown in previous sections of this report.

Access Indicators. **To study the impact of the New York GME demonstration on patient access, we used four types of indicators; (1) total volume, (2) payer mix, (3) volume of selected conditions/services, and (4) low birth weight infants. These are described below and the specific measures used are indicated in *Table 7-2.***

Total volumes. The change in inpatient admissions plus outpatient procedures will be assessed as a reduction in volume among outpatient procedure participants and may indicate reduced access to "safety net" services.

Table 7-1
Number of New York teaching hospitals by participation status

Location and Participating Status	Number of Hospitals
NYC and Suburban Ring	**77**
Continuing Participants	7
Withdrawals	24
Non-participants	46
Upstate	29
Continuing Participants	0
Withdrawals	6
Non-participants	23

NOTES: The hospitals are categorized as continuing participants, withdrawals, or non-participants according to their demonstration status—remaining in the demonstration, withdrawn from the demo, or never participating on September 30, 2002. Hospitals that participated in the demonstration for less than six months were considered non-participants.

SOURCE: RTI analysis of New York GME demonstration participation.

Counts are added to inpatient discharges to avoid understating hospital services during a period of rapid shifts in the locus of care. Outpatient procedure and visit counts are often discounted by ratio of outpatient revenue to inpatient revenue in calculating adjusted inpatient days. For the purposes of this analysis, though, an unweighted summation is more appropriate as our goal is to quantify the number of "contacts" with the hospital.

Table 7-2
Access indicators selected for analysis

Total volume: inpatient admissions and outpatient procedures

Payment Mix: Medicaid, Medicare, private insurance, and uninsured volume

Volume of Selected Services

- Trauma
- ER admission
- Substance abuse (alcohol and drugs)
- Mental health
- Deliveries (births)

Low Birth Weight Infants

Payer volumes. Declines in uninsured or Medicaid volume during the demonstration could indicate less access to demonstration hospitals for these vulnerable populations. This assessment is of particular importance because five out of the seven continuing participants are HHC hospitals that serve a large proportion of the Medicaid and uninsured.

Volume of selected conditions/services. With fewer residents available for care, some hospitals may restrict access for certain types of admissions and services. For instance, any decline in the volume of ER and trauma-related admissions could be indicators of reduced access since residents often are the first physicians to see these patients. Because psychiatric residency positions were a common target for reduction, we also examine changes in the number of both mental health and substance abuse admissions. We analyze the trend in deliveries because they are a critical service offered by the continuing participants given their large proportion of Medicaid female enrollees. OB-GYN residency positions were frequently targeted for cuts. Hence, changes in deliveries among participants relative to withdrawal and non-participant hospitals could indicate a demonstration reduction in local access to these services.

Low birth weight infants. Low birth-weight infants as a percentage of all births is a well-accepted measure of access (IOM, 1993). Lack of access to timely prenatal care has been shown to increase the likelihood of premature, low birth-weight infants. To the extent that residency reductions in outpatient settings may have impeded access to prenatal care, then the proportion of low birth-weight infants may increase.

7.3.3 Qualitative Analysis Plan

We supplemented the analyses based on claims with information derived from community interviews at selected demonstration hospitals. These interviews provide a community perspective on access-related issues attributable to the demonstration and those arising from other changes. In addition, information on clinic wait time for appointments, Emergency Room (ER) waiting time/walk-out rates, and wait time for diagnostic services, such as radiology, were also collected during the interview whenever possible. A systematic qualitative assessment employing surveys of patients and community leaders was beyond the project's work scope given the large pool of hospitals that initially participated.

Key informants and community groups—To obtain a community perspective, a networking approach was developed that identified appropriate groups and individuals to be interviewed about access issues. Individuals with extensive knowledge of community-based agencies and organizations in New York City were queried about potentially strong candidates for interviews. Strong candidates were defined as: 1) organized community groups whose members receive much of their care at participating hospitals, or 2) key informants who have been involved in access issues professionally or have worked with consumers of care from participating hospitals on their access and quality concerns.

In order to target sites for the community portion of the analysis, it was important to have both HHC and non-HHC representation. North Central Bronx Hospital (NCB) and Harlem Hospital were chosen as HHC sites since they had some of the earliest and largest reductions in residents. Harlem Hospital continues to use residents, but NCB, which had approximately 100 residents in the mid-1990s, now has none. Brooklyn Hospital was selected as the non-HHC site because it eliminated all residents in at least one satellite clinic.

Networking began in mid-2002, first by consulting John Billings, professor at New York University (NYU), and Judy Wessler, State Director of the Commission on the Public's Health System. Recommended individuals and groups were then contacted, and these contacts were asked to make further suggestions of potential interviewees. This process led to 40 agencies involved with public health, such as the United Hospital Fund, HHC, Patient Rights Hotline, Center for Independence of the Disabled, Institute for Urban and Family Health, and the Arthur Ashe Institute for Urban Health. These broad-based agencies and institutions were then approached for suggestions about more locally based contacts in the three sites mentioned above.

During the first site visit, our team attended a monthly meeting of the Access and Capacity Group co-chaired by Judy Wessler of the Commission on the Public's Health Service, and Kathryn Haslanger, vice president of the United Hospital Fund. Members of CMS, state and city health care agencies, and not-for-profit institutions concerned with health care were represented in the meeting. These agencies directed us to a variety of consumer groups and a number of well-informed individuals, often directors of other agencies, with general knowledge about changes in health care provision and issues in access and quality in the New York City area. Many were eager to provide further group and key informant contacts, yet few felt in a position to be a formal interview candidate. Leaders of non-health based consumer groups were seldom able to provide more than a few isolated anecdotal experiences with the study sites.

As a result, our focus turned to health-related agencies with staff that would be knowledgeable about their clients' access and quality concerns. This included persons who a) were devoted to health of a constituent group, such as AIDS or the elderly; b) provided health care but were not employees of the study sites (to avoid any conflict of interest); or c) were involved in helping patients enroll in Medicaid. Most supervisors/directors of these health-related agencies often did not have the first-hand knowledge we needed, so we attempted to arrange group interviews with their staff. The interview team found that access to a number of small groups was limited because a) staff working directly with patients were difficult to convene; b) they were already overburdened; and c) meeting time was at a premium with very tight agendas. One supervisor suggested her staff could complete individual written survey forms, but we chose not to mix data collection modes. Staff turnover also impeded the interview process – one site took over a year to arrange an interview due to major staff upheavals.

Overall, networking resulted in discussions about the demonstration and community impacts with several agencies. We interviewed one key informant and three small groups during two site visits, and three key informants were interviewed via telephone, resulting in a total of four key informant interviews and three small group interviews. Interviewees included:

- Former and current Community Advisory Board (CAB) officers and members
- A group of visiting nurses and their supervisors
- A community coalition director
- A community health educator, and
- A representative of an interagency coalition for elders.

The interviews were limited to those knowledgeable about Harlem and Brooklyn hospitals; we were not able to obtain interviews with key informants familiar with North Central Bronx Hospital.

7.4 Quantitative Results

7.4.1 Change in Patient Volume

Total patient volume (inpatient admissions and outpatient procedures) for the years 1995, 1997, 1999 and 2001 is presented in ***Table 7-3***. Continuing participants experienced a large decline in volume (16.6%) from 1995 to 2001, while other NYC teaching hospitals saw large increases. The volume for withdrawals in New York City increased by 12.2% and for non-participants by 18.2%. Throughout 1995-2001, the continuing participants experienced steady declines, while the withdrawals and non-participants had steady increases. Hospitals in upstate New York experienced far less volume growth. On net, patient volumes increased for teaching hospitals in both locations.

Table 7-3
Changes in total hospital volume, 1995-2001

	N[1]	Total volume[2]				Percentage change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	142,665	126,058	119,217	118,962	-16.6%
Withdrawals	24	772,016	788,431	851,897	866,156	12.2
Non-participants	46	1,009,303	1,028,478	1,117,710	1,192,865	18.2
All teaching	77	1,923,984	1,942,967	2,088,824	2,177,983	13.2
Upstate						
Withdrawals	6	187,763	180,854	182,251	184,658	-1.7
Non-participants	23	455,421	468,151	480,496	487,003	6.9
All teaching	29	643,184	649,005	662,747	671,661	4.4

NOTE:
[1] Refers to number of hospitals available for analysis (based on 1995 data).
[2] Refers to inpatient admissions and outpatient procedures.

SOURCE: RTI analysis of New York State uniform hospital discharge claims (SPARCS).

7.4.2 Change in Payer Mix

Tables 7-4 and 7-5 show changes in payer mix for New York City/suburban ring, and upstate New York, hospitals, respectively. For ease of presentation, we show just the base and final years (1995 and 2001). Table 7-4 shows that the majority of cases for continuing participants were either covered by Medicaid or uninsured (62.0% and 13.8%, respectively, in 1995).[30] A declining Medicaid share, when multiplied by the overall decline in volume, in New York City, results in an absolute reduction in Medicaid cases of 17,000 in the seven demonstration hospitals. By contrast, the majority of patients were privately insured or covered by Medicare among both withdrawals and non-participants. There were small changes in payer mix from 1995 to 2001. Continuing participants experienced a reduction in both Medicaid and privately insured patients, with a corresponding increase in their Medicare and uninsured volume. Medicaid shares also fell somewhat among withdrawals and non-participants due to the overall growth in patient volumes among these two groups of hospitals. The *absolute* number of Medicaid cases increased at both withdrawal and non-participating hospitals when shares are multiplied by volumes in Table 7-3.

There were much smaller changes in payer mix among upstate New York teaching hospitals (Table 7-5). The relative shares of Medicaid and uninsured patients fell among both withdrawals and non-participants.

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[30] Payer mix figures are slightly different from those presented in Section 6 due to the inclusion of outpatient procedures.

Table 7-4
Changes in payer mix for New York City and suburban ring teaching hospitals, 1995-2001

	Continuing participants		Withdrawals		Non-participants	
Percent of Total Volume[1]	1995	2001	1995	2001	1995	2001
Medicaid	62.0%	58.8%	32.3%	29.6%	21.8%	21.4%
Uninsured	14.5	15.8	8.9	9.0	5.2	3.7
Medicare	13.8	16.8	25.2	25.4	32.7	32.7
Private Insurance	9.1	7.8	29.9	32.9	37.3	39.3

NOTES:

[1] Refers to admissions plus outpatient procedures.

SOURCE: RTI analysis of New York State uniform hospital discharge claims (SPARCS).

Table 7-5
Changes in payer mix for upstate New York teaching hospitals, 1995-2001

	Withdrawals		**Non-participants**	
Percent of total volume[1]	1995	2001	1995	2001
Medicaid	13.7%	11.8%	13.6%	11.7%
Uninsured	5.7	2.8	5.3	3.7
Medicare	32.7	32.8	32.9	35.0
Private Insurance	44.0	47.2	42.6	41.6

NOTES:

[1] Refers to admissions plus outpatient procedures.

SOURCE: RTI analysis of New York State uniform hospital discharge claims (SPARCS).

7.4.3 Change in Service Mix

Tables 7-6 through 7-10 show changes in average hospital volume for selected services: trauma, emergency room admissions, alcohol and drugs, mental health, and deliveries. (The number of hospitals will sometimes be less than those shown in earlier tables because not all hospitals provided a given service. Hospitals with 30 or fewer cases also were excluded.)

Table 7-6
Changes in per hospital volume of trauma related services, 1995-2001

	N[1]	Trauma related volume[2]				Percentage change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	702	585	491	451	-35.7%
Withdrawals	24	1,410	1,394	1,372	1,325	-6.0
Non-participants	46	936	935	956	1,019	8.9
All teaching	77	1,062	1,048	1,043	1,064	0.2
Upstate						
Withdrawals	6	1,461	1,366	1,398	1,468	0.5
Non-participants	23	949	978	948	976	2.9
All teaching	29	1,055	1,058	1,041	1,078	2.2

NOTES:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

[2] Refers to inpatient admissions and outpatient procedures per hospital.

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

Table 7-7
Changes in per hospital volume of emergency room (ER) admissions, 1995-2001

	N[1]	ER Admissions				Percentage Change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	10,296	9,710	10,383	9,856	-4.3%
Withdrawals	24	11,635	12,513	13,077	12,965	11.4
Non-participants	46	6,600	6,821	8,403	9,121	38.2
All teaching	77	8,505	8,885	10,040	10,402	22.3
Upstate						
Withdrawals	6	7,194	5,056	5,904	9,953	38.4
Non-participants	23	5,410	5,429	5,932	5,784	6.9
All teaching	29	5,779	5,352	5,926	6,646	15.0

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

There was a dramatic drop (-36 percent) in trauma-related services among continuing participants, although average caseloads were relatively low even prior to the demonstration (Table 7-6). Withdrawals, which had the largest trauma caseloads of any hospital group, also experienced a small decline in trauma-related services from 1995 to 2001. These declines were offset by increases among non-participants over this time period with no net change in access to trauma care in New York City/suburban ring teaching hospitals.[31] Among upstate teaching hospitals, there was a small increase in trauma-related services, with no substantial differences between withdrawals and non-participants.

Consistent with the reduction in trauma-related services, continuing participants experienced a decline in patients admitted through the ER (Table 7-7). However, ER admissions increased dramatically among withdrawals and non-participating hospitals, resulting in a large net increase in such cases among New York City/suburban ring teaching hospitals. This is consistent with the restructuring of the ambulance service. Upstate New York teaching hospitals also experienced a large increase in ER admissions, particularly among withdrawals.

Table 7-8
Changes in per hospital volume for alcohol and drug related services, 1995-2001

	N[1]	Alcohol- and drug-related volume [2]				Percentage change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	3,987	3,197	3,236	2,998	-24.8%
Withdrawals	24	3,227	3,295	3,238	3,319	2.8
Non-participants	46	1,722	1,788	1,715	1,870	8.6
All teaching	77	2,397	2,394	2,328	2,431	1.4
Upstate						
Withdrawals	6	1,874	1,630	1,548	1,592	-15.0
Non-participants	23	1,044	1,092	1,104	1,160	11.0
All teaching	29	1,216	1,204	1,196	1,249	2.7

NOTES:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

[2] Refers to inpatient admissions and outpatient procedures.

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

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[31] Non-teaching hospitals also had a small increase in trauma-related services, but their caseloads were much smaller on average; data not shown.

Table 7-9
Changes in per hospital volume by hospital for mental health services, 1995-2001

	N[1]	Mental health volume [2]				Percentage change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	3,509	3,044	3,046	3,098	-11.7%
Withdrawals	24	5,929	6,179	6,482	6,631	11.8
Non-participants	46	3,819	4,284	4,294	4,794	25.5
All teaching	77	4,449	4,768	4,862	5,217	17.3
Upstate						
Withdrawals	6	6,146	6,424	6,961	8,196	33.4
Non-participants	23	4,239	4,784	5,346	5,636	33.0
All teaching	29	4,634	5,123	5,681	6,166	33.1

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

[2] Refers to inpatient admissions and outpatient procedures.

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

Continuing participants witnessed a dramatic decline in the alcohol and drug-related services, providing 1,000 fewer such cases in 2001 than in 1995 (Table 7-8). This was almost completely offset by corresponding increases in such services provided by withdrawals and non-participants in New York City and surrounding areas. Similarly, Upstate withdrawals exhibited sizable reductions in alcohol- and drug-related services, and again, this was offset by increases at nonparticipating hospitals.

Reductions in psychiatric residents among continuing participants may have contributed to 11.7 percent reduction in the provision of mental health services (Table 7-9). By contrast, both withdrawals and nonparticipants increased their provision of such services. The net result was a 17.3 percent increase in mental health services at New York City/suburban ring teaching hospitals. There was also a small increase in the provision of mental health services in New York City non-teaching hospitals (data not shown). Finally, upstate New York witnessed a dramatic increase in mental health services at its teaching hospitals, with caseloads growing by one-third at both withdrawals and non-participants.

Table 7-10
Changes in per hospital number of births, 1995-2001

	N[1]	Number of births				Percentage change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	2,505	2,163	1,854	1,685	-32.7%
Withdrawals	21	3,094	2,849	2,937	2,984	-3.5
Non-participants	31	2,595	2,212	2,422	2,476	-4.6
All teaching	59	2,762	2,426	2,536	2,554	-7.5
Upstate						
Withdrawals	4	3,499	2,566	2,524	3,078	-12.0
Non-participants	20	1,638	1,573	1,477	1,419	-13.4
All teaching	24	1,948	1,780	1,687	1,695	-13.0

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

The average number of births declined at all New York City/suburban ring hospitals, and dramatically so for continuing participants (Table 7-10). This reflects both a shift in deliveries from continuing participants to other teaching hospitals, as well as a secular trend in lower birth rates. The total number of births fell 6.3 percent in New York State as a whole from 1995 to 2001 (Sutton and Matthews, 2004). Declines in average deliveries per hospital were also observed among upstate hospitals.

7.4.4 Rate of Low Birth Weight Infants

Rates for low birth weight (LBW) infants are presented in ***Table 7-11***. Among continuing participants, at the start of the demonstration (1997), LBW accounted for 7.7 percent of their deliveries in New York City, versus 8.3 percent and 5.6 percent among withdrawals and non-participants, respectively.

During 1995 to 2001, continuing participants in New York City experienced a 1.6 percent decline in the rate of LBW infants compared with an increase of 0.1 percent among the withdrawals and 0.2 percent among non-participants. These relative changes presumably reflect the shift in some (higher-risk) Medicaid deliveries from continuing participants to other teaching hospitals.

Table 7-11
Changes in rate of low birth weight infants (as percent of all deliveries), 1995-2001

	N[1]	Rate of Low Birth Weight				Percentage change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	7.9%	7.7%	6.0%	6.3%	-1.6%
Withdrawals	21	7.0	8.3	7.4	7.1	0.1
Non-participants	31	5.3	5.6	5.8	5.5	0.2
Upstate						
Withdrawals	4	6.4	6.3	5.1	6.8	0.4
Non-participants	20	5.6	5.6	5.5	5.4	-0.2

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

Overall, hospitals in New York State have a higher rate of LBW infants than the national average of 3.9 percent (AHRQ, Guide to Preventive Quality Indicators, 2001), reflecting the higher provider risk of these infants. For those insured by managed care plans in New York City, the risk-adjusted LBW rate was 9.4 percent for Medicaid enrollees and 5.6 percent for commercial enrollees in 1999 (New York Managed Care Plan Performance, 2000).

7.5 Qualitative Results

In the next subsection we summarize our findings about the communities' awareness of the demonstration, changes in wait times, the impact of care provided in clinics, and continuity of care**.**

7.5.1 Awareness of the Demonstration

Only a few of our contacts were aware of the demonstration. The consensus was that users of health services in the city would be unlikely to have any knowledge of the resident reduction demonstration because of the wide variety of confounding variables affecting access. Indeed, none of the formal interviewees knew of the demonstration. The CAB representatives at both sites stated that they were not informed of such changes by the hospitals. One had noticed a reduction in ER residents, and another had seen an increase in the number of attendings, but neither knew of the demonstration's existence.

When interviewees were informed about the demonstration, the usual reaction was concern that cuts in the numbers of doctors meant fewer patients could be seen and already-long wait times would be even longer. Residents were seen as important additions to the provider pool. RTI staff explained that fewer residents could also mean more attendings, nurse practitioners (NPs), and physician assistants (PAs), so that the cuts did not necessarily mean a reduction in access. Another concern was that the reduction in residents would translate into fewer local-based attendings and specialists in the future since fewer residents would have the experience of working in their community.

7.5.2 Wait Times

We were not able to obtain reliable quantitative estimates of wait times and the information we did obtain through the interviews we could not directly link to reductions in residents due to the demonstration. Nearly all interviewees reported long wait times at clinics, from an average 2-3 hours to as high as 5 or more hours. They attributed this to a) inadequate staffing of , both “front desk” staff and clinicians, or b) a block appointment system in which patients were given a timeframe for the clinic hours, but were scheduled on arrival on a first come-first serve basis. One interviewee indicated that patients experienced long delays in obtaining appointments at a clinic where residents who had previously served patients had been eliminated entirely. We were unable to verify whether this reduction in residents was related to the demonstration. A few interviewees did report improvements in the wait time. For example, a new appointment-making system at selected HHC hospital clinics were reducing wait times and in addition, clinic wait times were reduced due to the opening of an urgent care center.

7.5.3 Care Delivered in the Clinic Settings

Despite the long waits for appointments at the clinic that had eliminated residents, satisfaction with care was reported to be very high.

Interviewees often referred to confusion among patients about their health care providers’ credentials. The consensus was that patients often do not distinguish between physicians, nurse practitioners, PAs, residents, and fellows. Obviously, this further compounded the difficulties in identifying community responses to the reduction of residents *per se*.

7.5.4 Continuity of Care

Both sites reported a gap in physician responsibility for the transition from inpatient to outpatient care. This was particularly a problem for community nurses in the HHC site. They stated that the end-result was an increase in emergency room (ER) visits, crisis management, and preventable increases in patient acuity. They also observed that many well-intentioned and competent physicians leave the system because they become overwhelmed. The role of resident reduction in this process, however, is unclear.

7.6 Summary of Findings and Discussion

Our key findings regarding patient access are:

Exhibit 7-1
Key findings: Patient access to care

Issues	Findings
Volume Declines	1. Hospitals already experiencing volume declines voluntarily decided to remain in the demonstration. Significant volume decline reduces the need for residents and should ameliorate any concerns over declining access. 2. Continuing participants experienced a larger decline in Medicaid volume compared to withdrawals and non-participants in the New York City area. Because the seven HHC hospitals that withdrew and the five who stayed in the demonstration all had similar declines in Medicaid volumes, any reduction was probably due to events unrelated to the demonstration. 3. Continuing participants had large declines in trauma-related services, ER admissions, mental health services, and substance abuse services compared to other hospitals, but these declines prior to the start of the demonstration in 1997. 4. Declines in trauma services and ER admissions also reflect changes in New York City's emergency medical system that rerouted thousands of ambulance runs to non-HHC hospitals. 5. Access to trauma services in teaching hospitals in New York City actually expanded over the study time period. 6. Continuing participants had the largest declines in the number of births, but the proportion of those births that were low birth weight actually fell. 7. Because Medicaid births are more likely to be high risk, the shift in case mix from HHC to other teaching hospitals actually improved unadjusted rates of low birth weight.
Local Health Care Advocate Perceptions	8. Qualitative interviews revealed dramatic changes in the overall provision of hospital-based care in New York City, especially among HHC safety-net hospitals that downsized beds and staff and lost Medicaid patients to non-participating control hospitals. Consequently, it is not possible to isolate demonstration effects on access from other changes that have taken place, especially in New York City. 9. No informed community leaders we talked to were aware of the demonstration. We interpret this as prima facie evidence that resident reductions had no net effects on access over and above other major changes over the same time period in the local area. 10. The greater on-site involvement of attending physicians in HHC facilities and shorter wait times for clinic appointments were noted by community activists as positive access improvements.

SECTION 8
QUALITY-OF-CARE IMPACTS OF THE NEW YORK GME DEMONSTRATION

8.1 Introduction

According to the Institute of Medicine (Lohr, 1990), quality is the degree to which health services for individuals and populations increases the likelihood of desired outcomes that are consistent with current professional knowledge. Quality can be measured with indicators in three key areas: *structure* (basic elements need to be present to provide quality service); *process* (appropriate care needs to be provided to patients at the appropriate time), and *outcome* (results should be optimal based on current medical knowledge). Structural elements include the availability of specific services; for example, hospital beds dedicated to mental health treatment or community outreach clinics. Process indicators describe a standard of care for particular types of patients or clinical conditions; for instance, protocols on how to treat stroke victims. Outcome indicators assess the health impacts of the care delivered; for instance, changes in mortality and complications rates.

In this report, we focus on the impact of resident reductions on outcome measures by constructing a set of quality indicators using claims data. Our quality indicators are drawn from Hare's sentinel work, *Inpatient Quality Indicators and Patient Safety Indicators* (2004). Residents often serve as substitutes for attendings, and the availability of residents could improve quality by allowing attendings to have lower case loads. On the other hand, the presence of less-experienced residents can result in unintended injuries and complications to patients. A more experienced physician may be able to avoid adverse events. Hence, it is unclear whether a reduction in residents decreases, increases, or has little impact on the quality of care.

Several key policy questions related to quality of care delivered are addressed in this report:

- Were there changes in risk-adjusted quality-of-care metrics for the demonstration hospitals?
- Where there improvements or declines in these rates?
- How do these rates compare with those of the non-demonstration hospitals for the same time period?
- Can these changes in the quality-of-care metrics be attributed to the residents?

8.2 Data and Methods

8.2.1 Data Source

We used the New York State all-payer claims (SPARCS) for 1995 through 2001 to examine the impacts of the New York resident reduction demonstration on patient quality of care. SPARCS data were described in detail in the previous section. SPARCS claims were not available to evaluate demonstration performance through 2003. In addition, all our quality indicators are limited to the events that occurred during the hospital admission as the data available did not allow for post-discharge outcome analysis (for example, 30-day mortality). We use selected quality indicators developed by the Agency for Healthcare Research and Quality (AHRQ) to perform the analysis.

8.2.2 Quality Measures

Quality indicators were based on AHRQ's *Inpatient Quality Indicators and Patient Safety Indicators* (2004) report. These indicators provide a perspective on hospital quality of care using hospital administrative data. They reflect quality of care inside hospitals, including inpatient mortality for certain procedures and medical conditions and the utilization of procedures for which there are questions of overuse, underuse, and misuse. For example, there is some evidence of overuse of initial and repeat Cesareans (or underuse of vaginal delivery after a previous Cesarean).

The majority of these indicators are based on high-risk procedures (e.g., Cesareans), and although residents may perform these procedures, attending physicians are required to be present. Further, with fewer residents, more of these procedures will be performed by the attending physicians themselves. Consequently, our research hypothesis is that resident reductions will have no impact on inpatient quality as measured by these indicators.

AHRQ Inpatient Quality Indicators include 7 volume indicators, 13 mortality indicators for conditions or procedures, and 9 utilization indicators. The AHRQ Patient Safety Indicators include 26 provider-level indicators and 6 area-level indicators. Four criteria were used for selecting indicators:

- Adequate volume. Many of AHRQ's indicators had very low volumes in the hospitals analyzed. For instance, none of the demonstration hospitals performed coronary bypass surgeries and very few did percutaneous coronary procedures. We required a minimum of 30 cases within a hospital for analysis. We also required that at least four of the seven continuing participant hospitals have this minimum.

- Sufficiently high rates to assess changes over years. Since our analysis focused on a pre/post demonstration comparison, we focused on indicators that could show variation. Some of the AHRQ safety indicators, such as anesthesia complications or death in low mortality DRGs, have rates of less than 1-in-1,000; therefore, it would be difficult to quantify statistical differences.

- Potentially impacted by residents. We also selected measures that could more readily be affected by patient-staff ratios, such as failure-to-rescue. Failure to rescue is the death of a patient with life-threatening complications, such as pneumonia, shock or cardiac arrest, upper gastrointestinal bleeding, sepsis, or deep vein thrombosis. These are all conditions for which early identification and intervention can reduce the risk of death. Previous research has shown that failure-to-rescue rates are very sensitive to hospital staffing ratios (Aikin et al., 2002; Needleman et al., 2002).

- Hospital specific indicators. We limited indicators to those that can be used to compare across hospital groups. Area-level measures, such as community-wide ambulatory care sensitive conditions, were not considered for this analysis.

Based on a thorough review of hospital volumes and adverse rates, we identified 7 measures for study and analysis (see ***Table 8-1***).

Table 8-1
Quality indicators selected for analysis

- **Mortality rates**
  - * Acute Myocardial Infarction (AMI)
  - * Stroke
  - * Pneumonia
- **Procedure utilization rates**
  - * Cesarean delivery
  - * Vaginal birth after Cesarean
- **Patient safety indicators**
  - * Obstetrics trauma
  - * Failure to rescue

SOURCE: RTI analysis of AHRQ Preventive and Inpatient Quality Indicators

8.2.3 Quantitative Analysis Plan

The rates for the quality indicators were calculated at the hospital level as follows:

Acute Myocardial Infarction: Numerator – Total mortality resulting from AMI
Denominator – All admissions for AMI

Stroke: Numerator – Total mortality resulting from Stroke
Denominator – All admissions for Stroke

Pneumonia: Numerator – Total mortality resulting from pneumonia
Denominator – All admissions for pneumonia

Cesarean Delivery: Numerator – All Cesarean deliveries (births)
Denominator – All deliveries (births)

Vaginal Birth After Cesarean:	Numerator – Vaginal delivery among women with prior Cesarean delivery Denominator – Women who had prior Cesarean deliveries
Obstetrics Trauma:	Numerator – All obstetrics trauma: vaginal delivery without instruments Denominator – All vaginal deliveries without instruments
Failure to Rescue:	Numerator – Total mortality resulting from failure to rescue Denominator – Patients who developed specified complications of care during hospitalization.

As noted earlier, we required a minimum of 30 patients in the denominator for each measure in order to minimize random variation and ensure stability in the rate calculations. All indicators were risk-adjusted to take into account hospital differences in the severity of patients they treated. This was particularly important, given the low-income, vulnerable populations treated by continuing participants. We used the methodology and software developed by AHRQ to "risk adjust" each hospital's data to reflect the score the hospital would have had if it had provided services to the average mix of patients. The quality indicators were risk-adjusted using age, gender, APR-DRG, and comorbidities relevant to specific conditions. For additional details on the empirical methods, refer to the Quality Indicator Reports published by AHRQ (http://www.qualityindicators.ahrq.gov/downloads.htm).

Tabular analyses of trends are presented for 1995, 1997, 1999, and 2001. Changes for the period from 1995 to 2001 are indicated. Rates for quality indicators are reported for continuing participants, withdrawals, and non-participants in both the New York City area and upstate New York. With only 7 continuing participants, we lacked the power to detect any statistical differences either between them and withdrawals or non-participants. We therefore did not perform statistical testing for any differences and given the 7 continuing participants we lack generalizability of these results. We did consider using the patient as the unit of analysis to increase the sample size available but because we are assessing reduction in resident reduction which is best measured as a behavior response as the hospital level we only performed hospital level analysis.

8.3 Findings

8.3.1 Mortality Rates

Risk-adjusted mortality rates for AMI, stroke, and pneumonia are presented in ***Tables 8-2 through 8-4***. The numbers in the tables represent the percent of patients with a given diagnosis who died in the hospital. There are no consistent patterns between continuing participants, withdrawals, and non-participants. Risk-adjusted mortality rates fall for some groups of hospitals, while increasing for others, but these patterns are not consistent across diagnoses. For the most part, changes over time reflect considerable regression to the mean.

Hospitals with relatively higher mortality rates in 1995 tend to show relatively greater declines in mortality by 2001. Conversely, hospitals with relatively lower mortality rates at baseline tend to show increases over time.

Table 8-2

Changes in risk adjusted mortality rate for acute myocardial infarction (AMI), 1995-2001

	N[1]	Risk adjusted mortality rate for AMI				Change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	8.3%	6.0%	3.4%	5.3%	-2.9%
Withdrawals	22	6.4	5.3	5.8	6.7	0.3
Non-participants	40	7.1	8.0	7.0	6.6	-0.6
Upstate						
Withdrawals	5	7.0	7.0	8.3	5.9	-1.1
Non-participants	22	4.9	5.2	5.0	4.9	-0.1

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

Table 8-3

Changes in risk adjusted mortality rate for stroke, 1995-2001

	N[1]	Risk adjusted mortality rate for stroke				Change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	9.1%	8.9%	12.6%	11.6%	2.5%
Withdrawals	22	14.3	10.5	9.8	9.8	-4.5
Non-participants	43	10.4	10.3	9.3	8.8	-1.6
Upstate						
Withdrawals	5	7.3	6.5	9.5	8.8	1.6
Non-participants	22	8.4	10.0	7.3	6.3	-2.1

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

Table 8-4
Changes in risk adjusted mortality rate for pneumonia, 1995-2001

	N[1]	Risk adjusted mortality rate for pneumonia				Change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	2.3%	2.2%	1.2%	2.9%	0.6%
Withdrawals	22	3.9	3.3	2.5	2.5	-1.4
Non-participants	43	5.3	4.5	3.3	3.4	-1.9
Upstate						
Withdrawals	6	3.7	3.5	4.5	1.7	-2.1
Non-participants	22	1.9	1.9	1.5	1.0	-0.9

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

8.3.2 Procedure Utilization Rates

Cesarean rates (calculated as a percent of all births) are shown in ***Table 8-5***. These rates declined slightly (2 percentage points) for continuing participants while remaining stable or actually increasing for withdrawals and non-participants. Since clinical practice guidelines indicate that Cesareans are over-used, the almost 5 percentage point increase for New York City non-participants is especially surprising. One explanation is that high-risk Medicaid deliveries were shifted away from continuing participants and to other New York City hospitals; yet, the AHRQ risk-adjustment software should have controlled for this. Alternatively, the continuing participants may have achieved a true quality improvement, but we lack enough observations to verify, statistically, such a conclusion.

Clinical practice now encourages vaginal delivery whenever possible for mothers following a prior Cesarean delivery. All hospital groups in our study show the opposite, however: a steady decline in vaginal births after Cesarean (VBAC) rates, with a particularly large drop among the continuing participants (see ***Table 8-6***). An increasing pool of high-risk mothers can not explain this finding, as all rates have been risk-adjusted. Given the consistency of this finding across hospitals, one explanation is that New York OB-GYNs have not adopted the change in the national consensus towards fewer follow-up Cesarean deliveries.

Table 8-5
Changes in risk adjusted rate of Cesarean delivery (percent of all births), 1995-2001

	N[1]	Risk adjusted rate of cesarean delivery				Percentage point change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	25.7%	22.7%	25.1%	23.7%	-2.0%
Withdrawals	21	23.6	25.6	24.7	26.1	2.5
Non-participants	31	25.6	26.9	28.6	30.2	4.6
Upstate						
Withdrawals	4	22.2	21.0	32.7	22.7	0.5
Non-participants	20	22.1	22.6	21.8	24.3	2.2

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

Table 8-6
Changes in risk adjusted rate of vaginal births after a Cesarean (VBAC) delivery, 1995-2001

	N[1]	Risk adjusted rate of vaginal births after cesarean delivery				Change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	37.8%	32.8%	24.8%	18.1%	-19.7%
Withdrawals	21	31.0	33.6	33.4	25.2	-5.8
Non-participants	31	24.7	26.0	23.0	19.6	-5.0
Upstate						
Withdrawals	4	33.1	43.9	35.7	26.1	-6.9
Non-participants	20	38.3	36.4	37.9	26.8	-11.4

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

8.3.3 Patient Safety Indicators

Table 8-7 presents changes in the rate of obstetric trauma among women undergoing vaginal deliveries without instruments. Although rates in upstate New York were notably higher than those downstate, there were few changes over time and no systematic differences by demonstration participation status.

Table 8-7
Changes in risk adjusted rate of obstetrics trauma associated with vaginal deliveries without instruments (percent of deliveries with trauma), 1995-2001

	N^1	**Risk adjusted rate of obstetrics trauma - vaginal deliveries without instruments**				**Change**
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	3.6%	3.8%	4.0%	4.8%	1.2%
Withdrawals	21	5.2	5.0	6.9	5.1	-0.2
Non-participants	31	5.4	5.7	5.4	6.2	0.8
Upstate						
Withdrawals	4	8.8	9.0	10.9	9.7	0.9
Non-participants	20	8.5	8.4	6.5	5.4	-3.1

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

All hospital groups showed modest declines in failure-to-rescue rates over the study period (***Table 8-8***), indicating improving quality over time. Because rates of decline were greater for hospitals with higher absolute levels at baseline, failure-to-rescue rates were almost identical across groups by 2001.

Table 8-8
Changes in risk adjusted rate of failure to rescue (percent dying from selected complications), 1995-2001

	N[1]	Risk Adjusted Rate of Failure to Rescue				Change
		1995	1997	1999	2001	1995-2001
NYC and Suburban Ring						
Continuing Participants	7	17.1%	14.7%	13.9%	15.7%	-1.4%
Withdrawals	23	16.5	15.2	15.1	15.4	-1.0
Non-participants	44	17.8	15.3	15.2	14.6	-3.2
Upstate						
Withdrawals	6	16.9	14.8	16.7	14.6	-2.3
Non-participants	22	15.5	14.1	14.6	14.7	-0.8

NOTE:

[1] Refers to number of hospitals available for analysis (based on 1995 data).

SOURCE: RTI analysis of 1995, 1997, 1999 and 2001 SPARCS data on inpatient admissions and outpatient procedures.

8.4 Summary of Findings

We used the New York SPARCS claims for all patients to construct multiple indicators of inpatient quality and patient safety. All indicators had been developed and previously tested by AHRQ. We limited our selection of indicators to those with a sufficient number of cases and those expected to be sensitive to residency reductions. We used the AHRQ methodology and software to risk adjust all indicators.

Our key findings regarding quality of care are summarized below:

Exhibit 8-1
Key findings: Quality of care

Issues	Findings
Mortality	1. No adverse mortality impacts resulted from the residency reductions. 2. Changes in risk-adjusted mortality for acute myocardial infarction, stroke, and pneumonia appear to reflect simple regression to the mean. Hospital groups with relatively high mortality rates at baseline showed declines over time, while those with relatively low rates tended to show increases from 1995 to 2001.
Maternity Outcomes	3. No clear evidence was found that the demonstration encouraged participants to shift high risk deliveries to other hospitals. 4. Continuing participants showed a decrease in risk-adjusted Cesarean deliveries relative to other hospitals, which is an indication of good quality. 5. A declining rate of vaginal deliveries following a Cesarean delivery was observed for all hospital groups, not just among participants, and can not be attributed to the demonstration. In addition, nationwide there has been a decline in vaginal deliveries after a Cesarean.
Patient Safety Indicators	6. No differences were found across hospital groups in either of the two patient safety indicators, obstetric trauma associated with vaginal delivery without instruments, or failure-to-rescue. 7. All hospital groups showed improvement in failure-to-rescue rates over the study period. Consequently, we conclude that there were no adverse patient safety impacts associated with the demonstration.

PART III: EVALUATION OF NATIONAL BBA PROGRAM IMPACTS ON GME

SECTION 9
IMPACTS OF BBA AND BBRA ON TEACHING HOSPITALS

9.1 Policy Background

Graduate medical education (GME), in the United States, is primarily conducted in hospitals. Hospitals incur costs associated with teaching graduate medical students (interns, residents, and fellows) such as faculty salaries, resident salaries, and management costs associated with compliance with Accreditation Council on Graduate Medical Education (ACGME), Residency Review Committees (RRC), and Medicare GME rules. Medicare helps teaching hospitals defray GME-related costs through two separate payment streams: direct medical education (DME), and indirect medical education (IME). DME payments cover resident and supervisory salaries and management-related costs while IME payments cover the extra patient care costs of medical services incurred as a result of using residents. Medicare's DME payments per resident are equal to the product of Medicare's share of inpatient days and the allowable per resident amount, based on average hospital-specific DME costs. Medicare's IME payments are made through an add-on to a hospital's DRG payment under Medicare's inpatient Prospective Payment System (PPS). The IME add-on rate is based on the ratio of interns and residents to hospital beds (IRB).

Concern over rising Medicare GME payments resulted in the passage of GME provisions in the Balanced Budget Act of 1997 (BBA), Sections 4621 and 4623. Four of the major mandatory IME-related provisions of Section 4621 were:

1. The number of FTE residents (allopathic and osteopathic medicine) were constrained, for payment purposes, to a level that is no higher than that reported on the hospital's *Medicare Cost Report* (MCR) for Fiscal Year (FY) 1996 (also applied in Section 4623 to DME);

2. The "multiplier factor" component of the IME adjustment factor was reduced from 1.89 in 1997 in several steps to 1.35 in 2001 and thereafter;

3. The IRB ratio was also constrained, for payment purposes, to a rate that is no higher than that reported on the hospital's MCR for FY 1996; and

4. Any post-BBA changes in FTE resident counts were calculated on basis of a three-year moving average (also applied in Section 4623 to DME).

The BBA allowed the Secretary of the Department of Health and Human Services (DHHS) to grant exceptions to BBA to allow for the establishment and expansion of residency programs in health shortage areas. The BBA also froze the level of per resident amounts used in determining DME payments.

The Medicare, Medicaid, and SCHIP Balanced Budget Refinement Act of 1999 (BBRA) changed the timing and magnitude of changes to the IME multiplier factor and allowed rural hospitals to increase the number of residents up to 30 percent over the FY 1996 value. Delays in the reduction of the IME multiplier factor were enacted in the Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act of 2000 (BIPA) and the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA) (see ***Exhibit 9-1***).

Under the 1997 BBA, the IME multiplier factor was legislated to decline 29 percent to 1.35 over a 4-period, a decline of roughly 7 percentage-points annually. The BBRA of 1999, BIPA of 2000, and finally, the MMA of 2003 postponed the initial reduction another seven years and put off the final reduction to 2007. Instead of a sharp 7 percentage-point fall over each of four years, the actual rate of reduction has been 2.5 percentage-points annually over an 11-year period. Our evaluation period spanned the 6 years of the New York residency reduction demonstration through mid-summer of 2003. As of October, 2002, teaching hospitals under BIPA were temporarily faced with the final multiplier of 1.35. Nevertheless, Congressional postponements greatly attenuated the financial impact of the baseline BBA glidepath on teaching hospitals.

9.2 Key Policy Questions

The primary goal of this chapter is to determine the impacts of the BBA and BBRA provisions on the number of residents in teaching hospitals and on Medicare IME payments. While the BBA exceptions rule for program expansion and the BBRA relaxation of the resident ceilings in rural hospitals is not explicitly evaluated, their possible influence is taken into account in interpreting changes in the number of residents and teaching hospitals after 1997.

CMS' RFP listed a range of Section 4621/23 policy questions, which we have grouped into four research areas:

Resident Caps

1. What are the final counts of FTE allopathic and osteopathic residents for purposes of DGME payment?

2. What impact did the capping of residents and the Intern/Resident-to-Bed (IRB) ratio have on Medicare outlays?

Special Rules and Exceptions

3. How do the BBA/BBRA special rules for new facilities and programs differ from the general rules?

4. How many hospitals of what size, type, and rural location benefited from the special rules?

Exhibit 9-1
Medicare's indirect medical education multiplier factors[1]

	Legislation				
Discharges occurring on or after	Omnibus Budget Reconciliation Act of 1987	Balanced Budget Act of 1997	Balanced Budget Refinement Act of 1999	Benefits Improvement and Protection Act of 2000	Medicare Prescription Drug, Improvement, and Modernization Act of 2003
Oct 1, 1996	**1.89**				
Oct 1, 1997		**1.72**			
Oct 1, 1998		**1.60**			
Oct 1, 1999		1.47	**1.60**		
Oct 1, 2000		1.35	**1.54**		
Apr 1, 2001			1.54	**1.66**	
Oct 1, 2001			1.35	**1.60**	
Oct 1, 2002				**1.35**	
Apr 1, 2004					**1.47**
Oct 1, 2004					1.42
Oct 1, 2005					1.37
Oct 1, 2006					1.32
Oct 1, 2007					1.35

NOTES:

Bolded figures indicate the actual multiplier factor in force in given year.

[1] $\text{IME adjustment factor} = \left(\left(1 + \frac{\text{Interns \& Residents}}{\text{Hospital Beds}} \right)^{0.405} - 1 \right) \times \text{MF}$ where MF is the multiplier factor.

SOURCE: Federal Register, selected years.

Three-Year Moving Average

5. How did the IRB ratios using a 3-year moving average compare to what they would have been in lieu of the cap?
6. What kinds of hospitals and programs were helped/harmed by the moving average in computing residents?
7. What was the impact of using the moving average on Medicare IME and DME outlays?

Net Impacts on Residents and Outlays

8. What was the impact of reductions in the IME multiplier factor, resident and IRB caps, moving averages, and of other provisions, taken together, on resident and payment trends *controlling for other changes?*

The rest of this Section is organized by each of the research areas. Answers to the questions in the first three areas involve straightforward accounting of changes. The fourth area requires a quasi-experimental design with multi-variate modeling.

9.3 Special BBA and BBRA Rules and Exceptions

The Balanced Budget Act called for special exceptions for "facilities that meet the needs of underserved areas" (Fed Register, August 1997; see ***Exhibit 9-2***). The exceptions developed in the BBA were mainly targeted at rural hospitals. Most hospitals cannot apply for increases in their FTE cap for new programs, whereas rural hospitals that develop new residency programs are eligible for FTE adjustments. Non-rural hospitals are only eligible for increases in their FTE cap if they had no prior residency program at the hospital. Hospitals that had been in the process of establishing a new program when the BBA legislation went into effect were also given a special exception. They can receive an increase in their FTE caps if they started a new program between January 1995 and August 1997.

Under the BBRA, only one new exception to the FTE cap was implemented. A new hospital that started construction of its facilities before August 1997 may have started a residency program by temporarily sending those residents to another hospital. Under the BBA, the newly constructed hospital would not have been eligible to receive an FTE adjustment; the BBRA changed that rule so that the new hospital could receive FTE payments for its residency programs.

The BIPA further differentiated rural hospitals from other hospitals. It created an exception that allows rural hospitals to increase their FTE cap that was set in December 1996 by up to 30%. It also developed exceptions for urban hospitals that start rural residency programs or rural tracks. Under the new regulations, these hospitals can receive an FTE cap adjustment if these residents spend at least two thirds of their residency in a rural area.

The Medicare Modernization Act (MMA) created legislation to adjust hospital FTE caps. The legislation requires hospitals that are training under their cap to receive a reduction in their resident cap. Rural hospitals that have fewer than 250 beds are exempt from any reduction in their FTE caps. The FTE slots from hospitals that receive a reduction will be reallocated to other hospitals that are already training over their cap, expanding programs, or establishing new residency programs. Preference for the additional slots is given to underserved areas applying for the FTE cap increase. An underserved area has been more broadly defined in the MMA and is not limited to rural areas. Rural hospitals are still given preference for qualifying for an increase in their FTE cap, but hospitals that are located in health professional shortage areas, are designated centers of excellence for underserved minorities, or those that are associated with historically black colleges also receive a higher priority than other hospitals. The legislation aims to reallocate the FTEs without changing the overall number of FTEs nationwide.

Exhibit 9-2

Exceptions to the FTE cap rules for non-rural hospitals and rural hospitals and changes made by legislation

<table>
<tr><th></th><th>Non-Rural Hospitals</th><th>Rural Hospitals</th></tr>
<tr><td>Balanced Budget Act of 1997</td><td><i>Without residency programs prior to January 1995:</i> can receive a cap adjustment.
<i>With residency programs prior to January 1995</i>: can only receive a cap adjustment for new programs started after January 1995 and before August 1997.</td><td>Can receive an FTE cap adjustment for a new program at any time.</td></tr>
<tr><td>Balanced Budget Refinement Act of 1999</td><td colspan="2">A new hospital that started construction prior to August 1997 that has residents temporarily training at another hospital can receive a cap adjustment.</td></tr>
<tr><td>Benefits Improvement and Protection Act of 2000</td><td>Hospitals with a new rural track program or a training program in a rural area, can receive a cap adjustment as long as the residents are spending 2/3rd's of their residency in the rural area.</td><td>The FTE cap set in December 1996 can be increased by up to 30%.</td></tr>
<tr><td rowspan="2">Medicare Prescription Drug, Improvement and Modernization Act of 2003</td><td colspan="2">Hospitals who are training under their cap may be subject to a reduction in their FTE cap. Hospitals who are training over their FTE cap, expanding an existing residency program, or creating a new residency program may apply for an increase in their cap.
Hospitals that are located in a health professional shortage area, are associated with historically black colleges, or are designated centers for excellence for underserved minorities, are given priority over other hospitals to receive an increase in their cap.</td></tr>
<tr><td>No provisions targeted to non-rural hospitals.</td><td>Rural hospitals are given a higher priority for increases in their FTE cap.
Rural hospitals with fewer than 250 beds are exempt from any FTE cap reduction.</td></tr>
</table>

SOURCE: Federal Register, selected years.

9.4 Resident Count Data

9.4.1 HCRIS

To answer questions related to the resident caps, Medicare Cost Reports (MCRs) from 1985 through 2001 were assembled for all hospitals that received PPS payments.[32] Most of these hospitals are short-term acute-care general hospitals. A few of the hospitals in the database are children's hospitals and specialized cancer hospitals. In tabulating the number of residents and teaching hospitals, 77 hospitals were missing an MCR for 2000, and 479 hospitals (66 teaching and 413 non-teaching) were missing 2001 MCRs. The average annual decline in the number of general hospitals was 71 between 1986 and 2000, indicating that CMS' HCRIS file did not contain a complete set of MCRs for 2001. A review of the 66 teaching hospital websites found that all but three are still open. Counts of residents, beds, and hospitals were imputed for missing providers. For hospitals missing year 2000 MCRs, the 2001 resident and bed counts were used. For hospitals missing 2001 MCRs, the year 2000 counts were used except for the three presumably closed hospitals. Another 18 teaching hospitals were deleted from the entire 1990-2001 time-series because of missing MCRs for multiple years or non-reporting of interns and residents. Deletions included all eleven New York Health and Hospital Corporation (HHC) hospitals plus a few other teaching hospitals with large residency programs (e.g., Duke University Hospital).

9.4.2 Worksheet E, Part A

Worksheet E, Part A is the primary source for resident counts used in this Section's analyses, especially for years after 1997. Prior to the BBA, full-time equivalent (FTE) counts of interns and residents used on Worksheet E, Part A were taken directly from the counts entered on S-3, Part I. Only a grand total count of FTE interns and residents is on S-3, Part I, including allopathic and osteopathic plus dental and podiatric as well. For years prior to 1997, CMS minimum data sets were the source of MCR data, and they included only the FTE resident counts presented on S-3, Part I. While S-3, Part I is supposed to be the source of the resident counts on the pre-BBA Worksheet E, Part A, it is possible that the values differed because those on Worksheet E, Part A were more meticulously reviewed by CMS due to their use in calculating IME payments.

Subsequent to the BBA's passage, Worksheet E, Part A was expanded from 6 to 24 lines, some of which are no longer being used (see Appendix 9.A for a more detailed discussion of the worksheet and a facsimile of the IME portion of the worksheet [***Exhibit 9.A***]). New lines were added for reporting the caps on medical residents, allowed residents, the rolling average of residents, and the cap on the intern and resident-to-bed ratio (IRB).

Resident Caps. The "cap section" of the worksheet consists of four lines. Line 3.04 is the "basic 1996 cap" and is the number of FTE medical residents on the last MCR dated

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[32] MCRs for 1985 through 1989 were not used for all analyses due to missing data elements. In addition, MCRs for 2002 and 2003 were not used because most had not yet been added by CMS to its *Hospital Cost Report Information System* (HCRIS) database in time for this report.

December 30, 1996 or earlier. Line 3.05 is the number of FTE residents in a new program. Line 3.06 is the adjusted FTE count of medical residents in affiliated programs. Line 3.07 is the "adjusted FTE cap" and is the sum of lines 3.04 through 3.06.

While the basic 1996 cap might seem to be a fixed, unchangeable number on the worksheet, it is not. Hospitals have been allowed to obtain upward adjustments in their cap line to account for residents on leave (e.g., pregnancy). In addition, when, as allowed by BIPA, qualifying rural hospitals expand their existing programs, the new residents are counted in cap line 3.04 rather than new program line 3.05. Note that this cap applies only to medical residents. There is no cap for dental and podiatric residents.

Counts of residents in new programs are not put in Line 3.05 until after the new program has passed its initial phase (see the discussion of new residency programs below). Once a new program has become established, its resident cap count is put into Line 3.05 and remains there until the program is terminated. That is, the resident counts in new programs are *not* moved to cap line 3.04.

The affiliation cap is used to allow for residents that are rotating in or out of a hospital as part of an affiliation agreement. For individual hospitals, this value may be negative (rotating out) or positive (rotating in).

Actual Residents. The actual number of FTE medical residents for the current year is entered on Line 3.08 while the actual number of FTE dental and podiatric residents for the current year is entered on Line 3.13.

Allowed Residents. Line 3.14 contains the number of allowed FTE residents for the current reporting year. It is equal to the number of FTE dental and podiatric residents plus the lesser of the actual number of FTE medical residents and the adjusted cap. It is in Line 3.14 where the current year's FTE cap is applied to medical residents.

Rolling Average. Line 3.17 is equal to the rolling average of residents plus add-ons for new residents (see the next paragraph) and residents that moved over to the hospital due to a hospital closure or a hospital that discontinued its residency program. The rolling average is the sum of Lines 3.14, 3.15 (prior year's Line 3.14), and 3.16 (penultimate year's Line 3.14) divided by the number of lines (up to three) with entries greater than zero. The "add-ons" are then added to the rolling average.

New Residency Programs. In order to not penalize new residency programs in their initial phases, the number of actual residents in such programs is not subject to the FTE resident cap or the rolling average. Consequently, hospitals are instructed to add residents in these programs to the rolling average with the result located in Line 3.17. Once the initial phase of a new residency program has passed (typically two to three years), a cap number is established and it goes into Line 3.05. Additionally, the number of actual FTE residents goes into Line 3.08 along with the rest of the actual count of FTE residents.

IRBs**.** The current year IRB (Line 3.18) is equal to Line 3.17 divided by Line 3. From the prior year's cost report, the prior year IRB (Line 3.19) is generally equal to the prior year's Line 3.14 divided by the prior year's Line 3. The settlement IRB used to calculate the IME adjustment factor and IME operating payments (Line 3.20) for the current year is the lesser of the current year IRB and the prior year IRB.

9.5 Trends in Residents and Allowable Caps

The overall trend in the actual number of residents employed in teaching hospitals between 1990 and 2001 is presented in this section. We then explore the contribution of allowed increases in resident caps to resident increases. The third part of this section explores the size distribution of residency programs in an effort to understand why reductions in the IME multiplier factor have a small impact on employment of residents.

9.5.1 Basic Resident Trends, 1990-2001

Except for a dip in 1995, the number of FTE residents in teaching hospitals increased every year from 65,371 in 1990 to 77,864 in 2000 and 79,527 in 2001 (***Table 9-1*** and ***Figure 9-1***). Further, the number of residents increased each year after the passage of the BBA in 1997. The increase in residents, together with the decrease in the number of hospital beds, would have raised the national average IRB ratio from 0.181 in 1990 to 0.243 in 2000 without the resident cap, a one-third increase in slightly over a decade. This would also raise Medicare outlays per DRG-based teaching hospital discharge, on average, from 13.2 percent in 1990 to 17.3 percent in 2001. Since 1997, the IRB has increased 16 percent. This post-BBA rate of increase in four years exceeds that over the previous seven years when no resident cap was in place.

9.5.2 Changes in Caps and Residents

The resident counts presented in Table 9-1 represent actual numbers of FTE residents employed in teaching hospitals. In principle, subject to RRC limitations, hospitals can employ as many residents as they want and prior to the BBA, Medicare made GME payments for all residents in approved programs at a hospital. With the implementation of the BBA, the concept of "allowed residents" was introduced. In simple terms, the number of allowed residents is equal to the number of dental and podiatric residents plus the lesser of the actual and employed medical (allopathic and osteopathic) residents in FY 1996 (the "medical resident cap").[33] Under the BBA, Medicare makes GME payments only for allowed residents.

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[33] There is no explicit cap for dental and podiatric residents.

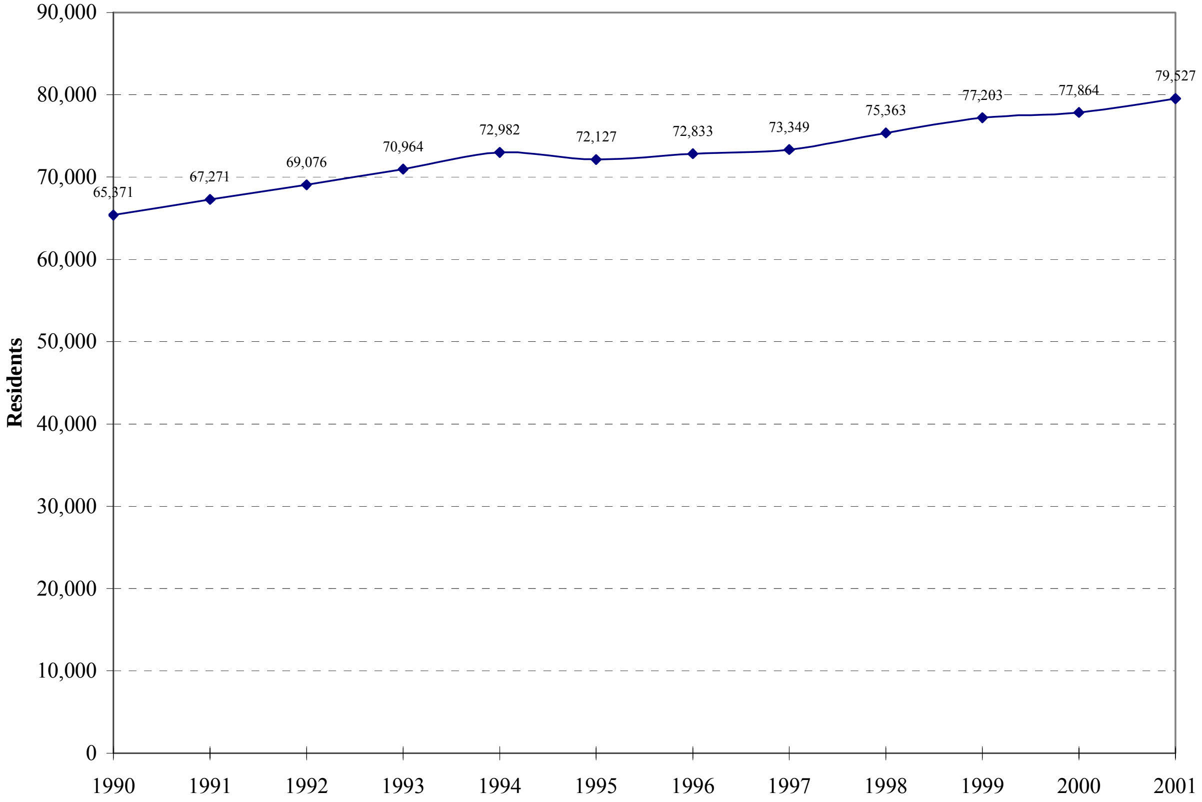
Table 9-1
Actual Interns and residents in short-term acute care teaching hospitals, 1990-2001

Federal Fiscal Year	Number of Hospitals	Actual FTE Residents	Beds	Intern & Resident to Bed Ratio
1990	1,026	65,371	361,146	.181
1991	1,048	67,271	364,094	.185
1992	1,057	69,076	364,442	.190
1993	1,082	70,964	362,529	.196
1994	1,095	72,982	359,290	.203
1995	1,081	72,127	347,150	.208
1996	1,112	72,833	339,022	.215
1997	1,140	73,349	352,477	.208
1998	1,142	75,363	349,915	.215
1999	1,147	77,203	346,044	.223
2000*	1,127	77,864	325,998	.239
2001*	1,126	79,527	326,666	.243

NOTES:
*Estimated values; see text for methods.

SOURCE: Medicare Cost Reports (MCRs), 1990-2001. Worksheet S-3, Part I for beds and for FTE residents 1990-97, Worksheet E, Part A for residents 1998-2001. All teaching hospitals included except HHC and other selected hospitals with missing MCRs for some years. Run: jimw02a, 4/1/2005

Figure 9-1
Actual medical and dental residents in teaching hospitals, 1990-2001



SOURCE: Medicare Cost Reports, 1990-2001.

As we will show, increases in medical resident caps, resulting from exceptions granted by CMS, allowed hospitals to increase the number of residents eligible for Medicare GME payment. As discussed in Section 9.3, the BBA provided for several types of exceptions to individual hospital caps for medical residents. Hospitals must apply to CMS for upward adjustments to their caps—CMS does not make upwards cap adjustments in the absence of an application. Increases in the aggregate resident cap should not be seen as an underlying "causal" factor in explaining resident increases but, rather, as a way of paying for the increased demand for residents.

Methodological Issues. Resident counts and caps for the years 1998 through 2001 were obtained from MCR Worksheet E, Part A. Too few hospitals used the revised worksheet during 1997 for us to report of 1997 data. Nearly all of the teaching hospitals reported in Table 9-1 were used in the post-BBA analysis of resident caps and actual residents.[34]

Total actual residents for 1996 was set to 71,813, about 1,000 less than the value reported in Table 9-1. This was done to allow for the fact, as noted above, that we dropped a few hospitals from the analysis. Because of the deletion of a few post-BBA teaching hospitals in ***Table 9-2***,

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[34] A maximum of seven hospitals were *not* used for any single year.

Table 9-2
Change in resident caps and actual residents from 1996-2001

	Resident Counts					Change between 1996 & 2001	
Resident Caps	1996	1998	1999	2000	2001	Number	Percent
1996 resident cap	70,061	71,804	73,240	73,565	73,890	3,825	5%
Urban	69,049	70,772	72,203	72,419	72,675	3,626	5%
Rural	1,016	1,032	1,037	1,146	1,215	199	20%
New residency programs	0	1,572	2,372	1,869	2,036	2,036	NA
Urban	0	1,515	2,283	1,747	1,909	1,909	NA
Rural	0	57	89	121	127	127	NA
Affiliations	0	227	495	500	623	623	NA
Urban	0	217	474	495	615	615	NA
Rural	0	10	20	6	7	7	NA
Adjusted resident cap	70,065	73,603	75,938	75,934	76,549	6,484	9%
Urban	69,049	72,504	74,792	74,661	75,199	6,150	9%
Rural	1,016	1,099	1,147	1,273	1,349	333	33%
Actual Residents							
Actual allopathic & osteopathic residents	70,065	72,156	73,763	74,289	75,610	5,545	8%
Urban	69,049	70,988	72,529	73,024	74,320	5,271	8%
Rural	1,016	1,168	1,234	1,264	1,290	274	27%
Actual dental & podiatric residents	1,748	2,182	2,443	2,846	3,237	1,489	85%
Urban	1,739	2,172	2,428	2,825	3,211	1,472	85%
Rural	9	9.35	15	21	26	17	191%
Total Actual Residents	71,813	74,337	76,207	77,134	78,847	7,034	10%
CY Allowed Residents							
Allowed residents	71,813	71,706	73,531	73,694	74,964	3,151	4%
Urban	70,788	70,671	72,434	72,528	73,780	2,992	4%
Rural	1,025	1,034	1,097	1,166	1,184	159	16%
Hospitals							
Total number of teaching hospitals		1,135	1,142	1,126	1,123		
Urban		1,036	1,042	1,029	1,027		
Rural		99	100	97	96		

NOTES:

NA = not calculated because denominator equals 0.

SOURCE: Medicare Cost Report Worksheet E, Part A, 1998-2001.

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total actual residents in 1996 for the subset of hospitals (71,813) was imputed by multiplying the ratio of actual residents in Table 9-2 to those in Table 9-1 for 1998 (0.986=74,338÷75,363) by the number of 1996 actual residents in Table 9-1 (72,833). Since MCRs before 1997 do not state the number of dental and podiatric residents, the split between medical residents and dental and podiatric residents for 1996 was based on the trend between 1998 and 2001. Since resident caps did not exist in 1996, the "basic and adjusted resident caps" for 1996 were set to the number of imputed "actual" medical residents for 1996. The number of allowed residents for 1996 was also set to the imputed "actual" medical residents for 1996.

Trends in Actual vs. Capped Residents. Table 9-2 displays increases in the resident cap, the actual number of residents, and allowed residents since 1996. The adjusted resident cap (adjusted for new programs and affiliations) increased from 1996 to 2001 by 4,745 residents.

Between 1996 and 2001, the medical resident cap increased by 3,825 residents and accounted for 54 percent of the overall increase in the total adjusted resident cap. Allowed adjustments to the caps for urban hospitals appear to account for most of the increase in the medical resident cap. In 2000, under BIPA, qualifying rural hospitals were allowed to increase their hospital cap up to 30 percent. The increase in the overall resident cap from 2000 to 2001 was 325, of which only 69 residents were in rural hospitals. New medical residency programs resulted in an increase of 2,036 residents, or approximately 31 percent of the overall adjusted resident cap increase. While rural hospitals doubled their number of new residents from 1998 to 2001, they accounted for only 6 percent of the overall new FTE residents.[35] Despite many restrictions placed on urban hospitals, they significantly increased their new residency slots and resident cap by over 1,900.

New affiliations accounted for a total of 623 additional resident slots, but this may be in part due to reporting errors. Under an affiliation, hospitals share their resident slots in order to facilitate rotation of residents between hospitals. An increase in one hospital's residents should lead to an equivalent decrease in another hospital's count, thus resulting in no increase at the national level. It is likely that some hospitals are incorrectly reporting their residents and caution should be used when interpreting the effects of affiliations. Removing "positive" affiliations from the resident cap calculations still results in an increase of 5,861 FTE residents from 1996 to 2001.

In rural hospitals, the total adjusted resident cap increased 33 percent (333) from 1996 to 2001. In the same time period, urban hospitals increased by 9 percent, a total of 6,150 FTE slots.

As medical resident caps rose, the actual number of medical residents training in hospitals also increased. Total actual medical residents grew 8 percent and the adjusted resident cap grew 9 percent by 2001. Since the adjusted cap and the actual number of residents in 1996 were equal, the difference in growth rates resulted in an aggregate gap of just over 900 residents by 2001. Dental and podiatric residents are not subject to the cap and grew by 85 percent. Overall, total residents increased by 10 percent.

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[35] Its possible that some rural hospitals reported their new resident caps in the reporting line for the 1996 basic cap rather than in the line for new residency programs.

Increases in the caps not only let actual medical residents increase, but also let allowed residents to increase. Allowed residents upon which Medicare makes GME payments increased by 3,151 (4 percent) between 1996 and 2001 with especially large increases of 1,825 between 1998 and 1999 and another 1,270 between 2000 and 2001.[36] Nearly half of the increase in allowed residents is due to increased dental and podiatric residents who are not subject to the medical resident cap.

Since the increase in both actual and allowed residents is partly due to increased caps, the question is raised of whether caps will continue to increase. The figures presented in Table 9-2 suggest that the major increases in the caps occurred before 2000. The large increase in residents in new programs in urban hospitals may have been due to new programs that had been planned before the BBA's implementation and, hence, were permitted by the BBA. Adjustments to the basic 1996 resident cap for unreported resident leaves during 1996 should diminish over time as well. Therefore, unless CMS decides permit the establishment of new resident programs, especially in medically underserved areas, it appears that resident cap increases should diminish or even come to an end.[37]

Hospitals above and Below their Cap. As noted above, the total number of medical residents is just over 900 residents less than the total adjusted cap. Assuming that random annual fluctuations and minor reporting errors account for hospitals that are training within 5 FTE residents of their cap, then approximately two thirds of hospitals were training at their cap in 2001. The remaining one-third of hospitals were evenly split between those training above or below their caps: 187 hospitals training 5 or more above their cap and 187 hospitals were training five or more training below. Roughly, 100 hospitals were training at least 10 or more under or over their cap.[38]

9.5.3 Distribution and Change of Residency Program Sizes

The resident cap increases and concomitant increases in actual and allowed residents suggest that the reductions in the IME multiplier factor and nominal caps did not have much of an impact on demand for residents. One possible reason for the lack of a large impact is that many teaching hospitals have few residents, in which case, declining GME payments relative to total Medicare payments would be small. Just over one-third of teaching hospitals had ten or fewer residents in both 1996 and 2001 (***Figure 9-2***). Together with the next size group (10-20), they accounted for about half of all teaching hospitals in both years. On the other hand, the number of teaching hospitals with ten or fewer residents fell slightly between 1996 and 2001 while the number with more than 300 residents actually increased. Several, if not most, of these increases in the large size categories are the result of hospital mergers. The 1998 merger of New

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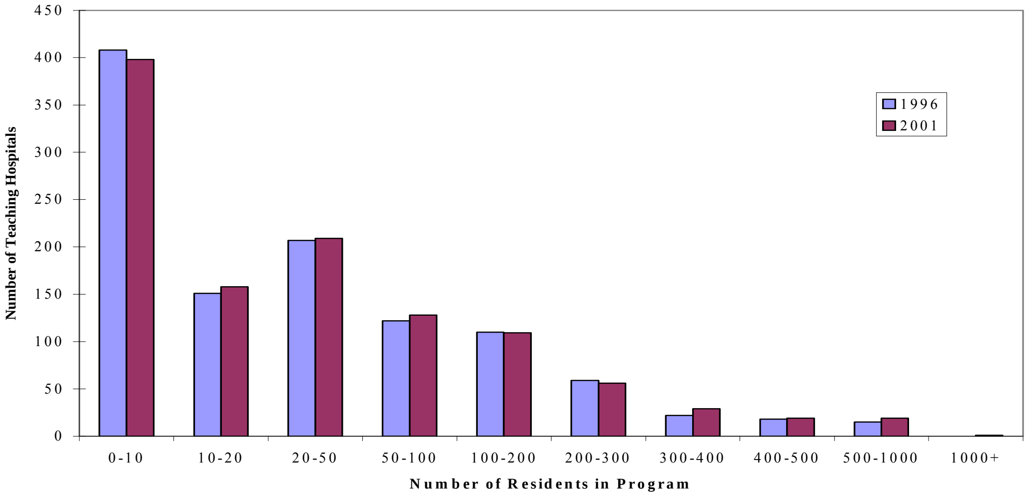
[36] The small decrease in allowed residents between 1996 and 1998 is an artifact of the imputations performed for the 1996 value and the fact that the allowed residents concept did not exist during 1996.

[37] The fall in IMGs coming to America following September 11, 2001 may make this a moot point.

[38] Under the MMA new regulations have been put in place to reallocate caps. Excess residents will be taken away from hospitals that have been regularly training under their cap and reallocated to hospitals that have been training over their cap. This reallocation has a strict set of criteria that include preference for underserved areas.

York and Presbyterian Hospitals, for instance, resulted in a hospital with more than 1,000 residents (see ancillary tables in Appendix 9.B).

Figure 9-2
Number of Teaching Hospitals by Program Size, 1996 and 2001



SOURCE: Medicare Cost Reports, 1996, 2001.

Although merger activity might account for the increase in the largest programs, we also found, of the nine residency program size groups represented in both years in Figure 9-2, that the mean number of residents increased in seven. Furthermore, despite a drop of ten hospitals in the 0-10 group, there was an increase of nearly 500 FTE residents trained in these small teaching programs. These types of results raise the question of why, despite reductions in the IME multiplier factor, that the number of FTE residents continued to increase after the BBA.

Hospitals were able to increase their actual settlement IRB ratio. Average settlement IRBs increased in six of the nine residency size program groups. While some of this was achieved by increasing residents, it was also through bed reductions as the mean number of beds fell in eight of the nine residency size program groups. Because of movement of individual hospitals between residency size groups might account for these observed results, we also examined the behavior of individual hospitals. Of the 1,018 teaching hospitals in 1996 that were still open in 2001, 77 percent reported fewer beds in 2001 than in 1996. Of these, nearly three-fourths had settlement IRBs in 2001 that were higher than in 1996. Overall, 62 percent of teaching hospitals had higher settlement IRBs in 2001 than in 1996. Hospitals are allowed to increase their IRBs, albeit with a one-year lag.

9.6 Three-Year Rolling Average

In this section we assess the impact on indirect medical education (IME) payments resulting from the combined effects of the BBA's rolling average of residents and the cap on the intern and resident-to-bed ratio. The assessment relies on a simulation on how IME payments are affected by the two BBA provisions. The rest of this section contains discussions on the legislative background, methods, and results.

9.6.1 Background

The mandated reductions in the IME multiplier factor reduced the financial return to hospitals from employing residents. Reduced returns, in turn, were widely expected by Congress and other policymakers to lead to resident reductions or at least much slower expansion. For hospitals that decided to reduce residents, the BBA provided two methods by which to lessen the financial impact. Section 4626(a) of the BBA initiated a voluntary resident reduction program similar to the New York GME Demonstration that offered transition payments to participants that adhered to a schedule of resident reductions.[39] The other financial concession was the rolling (moving) resident average used to calculate IME add-on payments to PPS operating payments.

The rolling average is calculated as the arithmetic mean of each hospital's allowed residents for the current year and up to two prior years. The rolling average is then divided by the number of adult short-term acute-care beds to obtain the IRB ratio used to derive the IME adjustment factor for operating payments under PPS. For hospitals with declining residents, the rolling average results in a higher effective IRB ratio than one based on current year allowed residents. Higher IRB ratios, in turn, result in higher IME payments. Interestingly, The rolling average is applied by CMS to all hospitals, not just those experiencing resident reductions. Consequently, the rolling average can result in lower instead of higher IME payments when hospitals experience resident increases.

In addition to the cap on allopathic and osteopathic residents, the BBA also stipulated a cap for the IRB ratio. The IRB cap prevents hospitals from obtaining *immediate* gains due to manipulating the IRB ratio through bed reductions. It does so by requiring hospitals to use the lesser of the rolling average IRB and its prior year IRB. While this rule prevents hospitals from obtaining immediate gains from bed reductions, higher IRBs can occur with a one-year lag.[40] Eventually, however, increasing IRBs due to bed reductions must come to an end since hospitals will bump up against occupancy ceilings.

9.6.2 Simulation Methodology

Although the rolling average was intended to help hospitals financially cope with resident reductions, only about 30 percent of teaching hospitals, after 1998, had fewer current year allowed residents than in both of the prior years (see ***Table 9-3***). Roughly another one quarter had current year residents above the prior two years. Because hospitals must use a rolling average when calculating their IME add-on payment, even when they do not have resident

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[39] Hospitals had to submit a participation application by November 1, 1999 (*Federal Register* 64:159, August 18, 1999, p. 44842). Only two hospitals participated in the program, implying that substantial transition payments were not enough to make up for lost GME revenues and high resident productivity.

[40] This was mentioned by CMS in the *Federal Register* 63:91 (May 12, 1998), p. 26324.

reductions, we decided to analyze the impact of the rolling average on all hospitals, not just those with resident reductions. Our analysis also incorporated any caps on the IRB ratio.

Table 9-3
Current year versus prior year allowed residents

Pattern of allowed residents over a 3-year period	1998[1]	1999	2000	2001
Current year allowed residents below both prior years	58.0%	33.5%	32.6%	29.2%
Current year allowed residents above both prior years	34.2	22.6	27.6	27.4
Mixed pattern	7.8	43.9	39.8	43.4
Total	100.0	100.0	100.0	100.0

NOTES:
[1] Only one prior year for 1998 MCRs.

SOURCE: Medicare Cost Reports, Worksheet E, Part A, 1998-2001.

We illustrate our simulation strategy through the use of the formula for calculating IME payments for the operating portion of PPS payments on Worksheet E, Part A. IME payments are determined by multiplying the Federal portions (FP) by the IME adjustment factor:

$$\mathrm{FP}(\mathrm{PPS}, \mathrm{MC}) \times \underbrace{\left(\left((1+\mathrm{IRB})^{0.405}-1\right) \times \mathrm{MF}\right)}_{\text{IME adjustment factor}}$$

where MF is the multiplier factor. Two sets of IME payments are calculated for each year, one using the actual *settlement* IRB and the other using an IRB based on the current year's allowed residents. There are two types of Federal portions used in the worksheet, the standard PPS Federal portions and those associated with discharges for Medicare beneficiaries enrolled in Medicare+Choice programs (MC, now Medicare Advantage). Since IME payments for standard PPS beneficiaries is the focus of the rolling average rule, Federal portions associated with MC beneficiaries were not used in simulating IME payments.[41]

Since the rolling average method was designed to average residents for up to three years, the sample was limited to those hospitals that had residents for both prior years[42] in order to estimate its maximum financial impact. We retained hospitals with no allowed residents in the current year due to the discontinuation of an entire residency program.

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[41] The PPS Federal portion is spread over four or five lines. The reason for this is to allow for multiple IME multiplier factors that may have been effect during a hospital's fiscal year. For simplicity, we simply summed the lines for the PPS Federal portions and applied just one multiplier factor per year, i.e., 1.72 for 1998 and 1.60 for 1999 through 2001.

[42] An exception was made for 1998 because only a two-year rolling average was used by most hospitals.

The analysis excluded 1997 because only a small portion of teaching hospitals used the revised Worksheet E, Part A format that year. Hospitals with poor quality MCR data were also excluded from the analysis, e.g., inconsistent entries, extreme outliers.[43]

9.6.3 Impact of Rolling Average Method on Resident Caps

For hospitals that had fewer residents in the current year than in the two prior years, use of the rolling average increased the numerator of the IRB ratio by 3.6 to 4.4 residents (difference between the top two lines in the top panel of ***Table 9-4***). As a consequence, average annual settlement IRBs for this group of hospitals to were one percentage point higher than they would have been based solely on current year (CY) allowed residents (third line in the top panel of Table 9-4).

Simulated Medicare savings (in percent) due to a slightly higher "rolling average" IRB is shown in the bottom panel in Table 9-4. Negative percentages indicate increased Medicare outlays whereas positive values indicate Medicare savings. The rolling average cushioned the loss of residents and increased IME payments for hospitals. Average IME payments were 1.9 percent higher in 1998 then peaked at 4.2 percent higher in 2000 for these hospitals. By contrast, the rolling average and the IRB cap resulted in lower Medicare IME payments for hospitals with more residents in the current versus prior years. Medicare savings were 22.4 percent in 1998 for this group of 361 hospitals before falling to 5.4 percent in 2001. Medicare savings were also achieved for hospitals with a mixed pattern of residents. Overall, for the three groups of hospitals taken together, the rolling average and IRB cap actually saved Medicare 9.2 percent in 1998 ($367 million) and as little as 2.2 percent, $91 million in 2000.

Despite the greater share of hospitals in 2000 and 2001 that had increased residents or a mixed pattern, Medicare savings were lower in these two years than in 1998 and 1999. One reason for lower savings is that the Medicare multiplier factor used in the simulations did not change after 1999. Another reason is that the difference between actual IRB and the settlement IRB decreased, especially for the group that had more residents in the current year than in the prior two years where the difference in IRBs fell from a high of 0.06 in 1998 to 0.03 in the last two years (bottom two lines in the second panel in Table 9-3).

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[43] One hospital had an operating Federal portion of over a million dollars per Medicare discharge.

Table 9-4
Impact of rolling average and IRB resident constraints on Medicare current year IME operating payments

Relationship between current year and prior year residents	1998[1]	1999	2000	2001
Medical residents below both prior years				
Number of hospitals	**482**	**278**	**315**	**287**
Allowed residents	67.6	62.7	56.7	46.1
Rolling average allowed residents	71.2	66.5	61.1	50.1
Allowed residents IRB	0.18	0.17	0.17	0.14
Settlement IRB	0.19	0.18	0.18	0.15
Medical residents above both prior years				
Number of hospitals	**361**	**205**	**264**	**261**
Allowed residents	80.7	119.5	116.0	126.9
Rolling average allowed residents	78.3	114.7	111.2	122.3
Allowed residents IRB	0.22	0.30	0.29	0.31
Settlement IRB	0.16	0.25	0.26	0.28
All teaching hospitals				
Number of hospitals	**927**	**886**	**963**	**970**
Allowed residents	67.8	74.6	72.4	72.7
Rolling average allowed residents	68.7	74.9	72.5	72.5
Allowed residents IRB	0.18	0.20	0.20	0.20
Settlement IRB	0.16	0.18	0.19	0.19
Medicare Savings				
Medical residents below both prior years[2]	-1.9%	-3.2%	-4.2%	-3.7%
Medical residents above both prior years	22.4	12.7	5.5	5.4
Mixed pattern[3]	25.4	15.8	2.5	2.1
All teaching hospitals	9.2	9.7	2.2	2.6

NOTES:
[1] Only one prior year for 1998.
[2] Negative values indicate increased Medicare outlays.
[3] Teaching hospitals not in the other two groups.

SOURCE: Medicare Cost Report Worksheet E, Part A, 1998-2001.

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9.7 Financial Performance of Teaching Hospitals

In this section, we address the link between GME payment reductions and the financial performance of teaching hospitals.

9.7.1 Methods & Data

The analysis of financial performance in teaching hospitals is based on Medicare Cost Reports for the post-BBA 1997-2001 period. Worksheet E and G-3 provide financial information on three types of hospital revenues. Total patient revenues refer to operating revenues related to patient care. These revenues are net of any insurer discounts and disallowances and, as such, are what hospitals actually received in caring for patients. Total facility revenues into non-patient revenues such as gift shop, parking, physician office and other building revenues, donations, investment income, and other activities. PPS revenues refer to inpatient payments for Medicare beneficiaries covered under regular fee-for-service Medicare. PPS revenues were reported with pass-through capital and other amounts only after 1996.

Two hospital margins are reported, operating and total. They differ in that total margins also include the net of non-operating revenues (e.g., parking, investment income) and non-operating costs. This net figure generally adds considerably to the "bottom line" of teaching hospitals.

Inspection of the revenue and profit data indicated a small number of erroneous figures where revenues and costs produced extraordinarily high or low margins. We deleted observations where operating revenues divided by operating expenses were less than -.50 (bottom 4 percent of observations) or greater than +.34 (top 1 percent deleted). Similar trims were applied to total facility margins. Slightly over 1,000 teaching hospitals remained for analysis.

Overall trends in teaching hospital financial performance are presented first. We then stratify financial performance by Medicare dependency above or below 40 percent of all discharges, major (IRB greater than .25) versus minor teaching, urban/rural location, and proprietary, government, or private voluntary ownership.

9.7.2 Overall Trends in Revenues and Margins: 1985-2001

Overall. ***Table 9-5*** displays trends in several measures of revenues and margins in teaching hospitals over the 1985-2001. All observations have been trimmed by deleting the top and bottom 1% of hospital-years based on operating or total margins. The total number of hospitals with reported residents is given in the first column. The number of teaching hospitals declined through the late 1980s, but by 2001, the number had increased to approximately its 1985 level. Teaching hospitals as a whole have experienced substantial, consistently high, revenue growth during the last 16 years prior to 2001. Total patient revenues, net of insurer discounts and disallowances increased 3.3-fold at an annual growth rate of 7.8 percent. Total

Table 9-5
Trends in revenues ($ millions) and margins in teaching hospitals, 1985-2001

Year	No. of Hospitals	PPS Revenues[1] With Pass Through	PPS Revenues[1] Without Pass Through	Total Patient Revenues[1]	Total Facility Revenues[2]	Operatin g Margin[1]	Total Margin[2]
1985	1,048		$17.4	$61.6	$66.2	1.4%	6.2%
1990	963	--	24.4	104.7	112.5	-3.0	3.1
1996	1,044	42.4	36.6	149.4	162.3	-1.5	5.5
1997	1,072	42.4	37.0	156.4	171.8	-2.5	5.2
1998	1,062	42.7	39.5	166.1	182.2	-4.1	3.7
1999	1,046	43.9	41.3	175.8	192.2	-4.8	3.2
2000	1,035	46.8	41.9	190.5	206.7	-4.0	3.4
2001	1,039	49.9	37.0	205.9	220.4	-3.6	3.0
Annual Growth Rates							
1985-1996		--	7.0%	8.4%	8.5%		
1996-2001		3.3%	0.2%	6.6%	6.3%		

NOTES:
[1] Excludes to 1% and bottom 4% where -.5 > operating margin > .34.
[2] Excludes top and bottom 1% where -.40 > total margin > .33.
SOURCE: Medicare IPPS claims, Worksheet E and G-3, 1985-2001; Bitejo3 (4/15/05).

facility revenues experienced almost the same growth over the entire period. Revenue growth between 1985-1996 exceeded growth after 1996 during the post-BBA period by nearly two percentage points annually.

Medicare PPS revenues are presented in two series, with and without pass-throughs. Medicare revenue growth without pass-throughs was considerably lower than for overall patient revenues and particularly so in the post-BBA period. Even including pass-throughs, the post-BBA growth in Medicare PPS revenues was only one-half that for total patient revenues. In 2001, Medicare PPS revenue, including pass-throughs, was roughly one-quarter of total patient revenues in teaching hospitals. Medicare's share of teaching hospital revenues has fallen fairly consistently over the 16-year period.

Except for 1985, average patient operating margins have been negative for teaching hospitals. Losses usually range between -3 percent and -5 percent with the largest loss rates coming soon after the enactment of the BBA legislation. Operating margins show a secular decline from the late 1980s to the late 1990s. Total margins in teaching hospitals reflect a quite different financial situation. Total margins are positive in all years since 1985 and range between +3 percent and +6.6 percent. During the post-BBA years, total margins declined somewhat but still remained in the positive range above 3 percent.

Revenue and margin trends suggest some negative effects of BBA on the financial positions of teaching hospitals. This was likely due, in part, to much slower growth in Medicare revenues and slightly lower growth in non-Medicare revenues. Continued robust growth in other patient revenues and non-operating revenues appeared to offset most of any depressing effect of Medicare payment reforms, however.

Medicare Dependency. ***Tables 9-6*** stratifies trends in revenues and margins by Medicare dependency. Highly dependent Medicare teaching hospitals were specified as those having at least 40 percent of their discharges paid for by Medicare. As of 2001, about 3.5-in-10 hospitals were highly dependent on Medicare according to this criterion. Medicare dependency has risen over time among teaching hospitals. For example, in 1990, only slightly more than 2-in-10 teaching hospitals were Medicare dependent. Both high and "low" Medicare dependent teaching hospitals experienced rapid growth in revenues between 1985 and 1996 prior to the BBA. Revenue growth slowed considerably in the post-BBA 1996-2001 period, especially in the highly dependent group. Patient and total facility revenues in highly dependent teaching hospitals average 70-75 percent of those in "other" teaching hospitals. Yet, despite having less revenues, highly dependent teaching hospitals enjoy considerably higher operating margins than other teaching hospitals. Total margins are more similar.

Program Size. Revenue growth in major teaching hospitals, defined as having resident-to-bed ratios at least equal to .25, was greater than for minor teaching hospitals prior to the BBA (***Table 9-7***). This pattern was reversed post-BBA with somewhat stronger revenue growth in minor teaching facilities. Nevertheless, patient and total revenues in major teaching hospitals average double those in minor teaching hospitals. Operating margins in major teaching hospitals were uniformly negative between 1985-2001 and became even more negative post-BBA. Operating margins for minor teaching hospitals hover near zero with a low of about -2 percent in the early BBA era. Although total margins still are positive for both groups post-BBA, minor teaching hospitals appear to be less affected than major teaching hospitals. Major teaching hospitals rely on non-operating revenues far more than do minor teaching hospitals for their overall financial solvency. Because of the continued growth in residents and shrinking bedsizes, there has been a significant trend towards major teaching hospitals; in 1990, 17 percent were major teaching versus 27 percent in 2001.

Urban-Rural Location. As with major teaching hospitals, there has been a strong trend towards more rural teaching hospitals as facilities in these areas start new programs and/or enter into resident rotations (4.5 percent rural in 1990 compared with 8.4 percent in 2001). Nevertheless, revenue growth has been somewhat stronger in urban teaching hospitals (***Table 9-8***). Urban hospital patient and total revenues also tend to be 2.5-times higher as well. Although larger, and experiencing faster revenue growth, the urban teaching hospitals exhibit consistently negative operating margins while rural teaching hospitals hover around break even on operations. Post-BBA operating margins are declining for both groups. Total margins are relatively high, by contrast, for both groups, and particularly for rural teaching hospitals. The year 2001, however, suggests increasing financial difficulties for the rural group.

Table 9-6
Trends in revenues ($ millions) and margins in teaching hospitals, by Medicare dependency, 1985-2001

	Total Patient Revenues		Total Facility Revenues		Operating Margin		Total Margin	
Year	High[1]	Other[2]	High	Other	High	Other	High	Other
1985	$41.42	$65.46	$43.56	$71.80	5.3%	0.9%	6.9%	5.8%
1990	68.98	114.92	72.68	125.55	-1.4	-3.3	3.5	3.0
1996	107.38	175.71	115.02	193.44	0.7	-2.8	6.3	5.0
1997	110.49	185.23	119.25	207.47	-0.0	-3.5	6.6	5.3
1998	112.13	195.90	120.69	217.09	-2.0	-4.8	3.9	3.6
1999	116.11	207.87	124.70	231.26	-2.0	-5.6	3.4	2.9
2000	128.54	226.76	136.90	249.74	-1.5	-4.8	3.6	3.2
2001	143.23	243.64	150.90	266.62	-0.9	-4.6	2.8	2.9
Annual Growth Rates								
1985-1996	9.0%	9.4%	9.2%	9.4%				
1996-200	5.9%	6.8%	5.6%	6.6%				

NOTES:

[1] High = Medicare share of discharges > = 40%.

[2] Other = Medicare share of discharges < = 40%.

SOURCE: Medicare IPPS claims, Worksheet E and G-3, 1985-2001; Bitejo3 (4/15/05).

Table 9-7
Trends in revenues ($ millions) and margins in teaching hospitals, by major-minor teaching, 1985-2001

	Total Patient Revenues		Total Facility Revenues		Operating Margin		Total Margin	
Year	Major[1]	Minor[2]	Major	Minor	Major	Minor	Major	Minor
1985	$103.95	$53.37	$119.27	$56.48	-3.4%	3.2%	4.2%	6.8%
1990	193.91	85.89	214.88	90.66	-7.2	-1.0	1.6	3.9
1996	263.71	115.97	291.97	124.18	-5.8	0.8	3.5	6.7
1997	267.84	124.82	304.83	135.05	-6.3	-0.2	4.3	6.5
1998	281.89	129.84	315.24	139.91	-7.3	-2.0	2.9	4.3
1999	296.79	137.46	335.58	146.64	-8.1	-2.5	2.4	3.5
2000	312.41	147.26	345.48	157.65	-8.1	-0.9	1.8	4.4
2001	325.99	161.54	362.94	170.58	-8.2	-0.2	1.1	4.3
Annual Growth Rates								
1985-1996	8.8%	7.3%	8.5%	7.4%				
1996-2001	4.3%	6.9%	4.4%	6.6%				

NOTES:

[1] Major = Resident-to-bed ratio IRB greater than or equal to 0.25.

[2] Minor IRB < .25.

SOURCE: Medicare IPPS claims, Worksheet E and G-3; mcrdata38 (4/18/05).

Table 9-8
Trends in revenues ($ millions) and margins in teaching hospitals, by rural-urban location, 1985-2001

	Total Patient Revenue		Total Facility Revenue		Operating Margin		Total Margin	
Year	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1985	$73.92	$34.15	$81.18	$36.06	1.1%	7.1%	6.0%	8.2%
1990	114.42	48.87	124.44	51.69	-3.0	-0.8	3.1	5.0
1996	156.53	61.52	171.52	65.54	-2.0	2.1	5.3	7.5
1997	163.71	62.02	182.33	67.24	-2.6	1.0	5.5	7.8
1998	174.52	64.96	193.00	69.82	-4.2	0.9	3.6	6.7
1999	185.42	67.64	205.32	72.97	-5.0	0.6	2.9	6.6
2000	201.11	75.88	220.34	82.22	-4.1	0.4	3.1	7.3
2001	216.52	89.22	236.20	84.37	-3.6	-0.9	2.8	4.6
Annual Growth Rates								
1985-1996	7.1%	5.5%	7.0%	5.6%				
1996-2001	6.7%	7.7%	6.6%	5.2%				

SOURCE: Medicare IPPS claims, Worksheet E and G-3; mcrdata38 (4/18/05).

Ownership. The growth and spread of residents into new hospitals has resulted in an increase in the proportion of proprietary in all teaching hospitals (8.6 percent in 1990 compared with 14 percent in 2001). Revenue growth, however, has been considerably less in proprietary teaching hospitals throughout the 1985-2001 period (Table 9-9). Revenue growth slowed for proprietary hospitals as well post-BBA, but appears to have actually increased for both government and private voluntary teaching hospitals. This may be due to the conversion of less successful teaching hospitals to a for-profit status. Although government and private teaching hospitals experienced similar revenue growth over the 16-year period, operating and total margins are quite different. Government operating margins are always negative and range between -6 and -10 percent. Private voluntary operating margins are also negative but only about one-half as much as government hospitals. As might be expected, proprietary hospitals usually enjoy positive operating margins on considerably less revenues. Proprietary operating margins also appear to have increased post-BBA unlike the other two groups. Total margins for proprietary hospitals are hardly affected by non-operating revenues. Government and private voluntary hospitals both average positive total margins implying that they rely heavily on non-operating revenues to “break even.” These revenues would include public subsidies and private donations, primarily.

9.8 Current Year Actual BBA GME Payment Reductions

In this section, answer the BBA impact question:

How large were the payment reductions in GME payments each year due to reductions in the IME multiplier factor and other changes?

Table 9-9
Trends in revenues ($ millions) and margins in teaching hospitals, by ownership status, 1985-2001

	Total Patient Revenue			Total Facility Revenue			Operating Margin			Total Margin		
Year	For-Profit	Gov'mt	Private Voluntary	For-Profit	Gov'mt	Private Voluntary	For-Profit	Gov'mt	Private Voluntary	For - Profit	Gov'mt	Private Voluntary
1985	$52.25	$72.89	$72.74	$54.47	$92.57	$78.48	3.2%	-5.1%	2.0%	7.9%	4.6%	6.1%
1990	77.31	113.55	111.52	80.90	130.64	120.14	-1.2	-11.4	-2.3	2.9	1.4	3.3
1996	97.13	150.88	150.98	102.10	188.68	162.67	4.7	-7.6	-1.7	7.0	2.1	5.7
1997	89.10	167.99	161.81	94.22	197.54	178.49	1.7	-5.8	-2.2	3.7	6.0	5.8
1998	92.53	165.57	173.52	98.60	199.50	189.19	-1.2	-6.8	-4.1	2.6	4.1	3.7
1999	100.09	182.00	183.48	104.25	221.91	201.03	1.8	-9.8	-5.0	5.1	0.7	2.9
2000	113.25	184.57	198.00	118.20	234.59	214.31	5.0	-7.8	-4.4	8.0	1.8	2.9
2001	121.98	216.22	213.79	124.43	279.47	229.46	7.0	-9.5	-4.0	8.0	-0.4	2.6
Annual Growth Rates												
1985-1996	5.8%	6.8%	6.9%	5.9%	6.7%	6.9%						
1996-2001	4.7%	7.5%	7.2%	4.0%	8.2%	7.1%						

SOURCE: Medicare IPPS Claims, Worksheet E and G-3; mcrdata38 (4/18/05).

9.8.1 Methods and Data

To answer this question, we used the two Medicare DME and IME payment formulas and varied three components: the multiplier, the outlier GME add-on, and the managed care MMC carve-out. We define a "current year" reduction in GME payments as the difference between actual reported GME revenues on the hospitals cost report (Worksheet E) and revenues the teaching hospital would have received if there had been no BBA change in the three components (for other studies using this method, see Zwanziger and Melnick, 1988; Gruber, 1994; Cutler, 1998).

This difference is sometimes referred to as the "current year bite," or revenue loss. Lower multipliers and discontinuing GME add-ons to outlier payments reduces actual GME revenues and produces negative "bites." Conversely, paying teaching hospitals directly for GME that formerly had been part of the Medicare managed care premium will raise current GME revenues and produce a positive bite. We compute separate, as well as total, bites for IME and DME payments.

The IME payment $[\mathrm{IME}]_{h,t}$ for hospital *h* during year *t* can be expressed using the following flexible formula:

$$(9.1) \qquad [\mathrm{IME}]_{h,t} = \left([\mathrm{Inlier}]_{h,t} + a_t[\mathrm{Outlier}]_{h,t} + b_t[\mathrm{MMC}]_{h,t}\right) \times c_t \times \left[\left(1 + [\mathrm{IRB}]_{h,t}\right)^{0.405} - 1\right]$$

where $[\text{Inlier}]_{h,t}$ is the total DRG inlier payments for hospital h in year t, $[\text{Outlier}]_{h,t}$ is the total outlier payment amounts, $[\text{MMC}]_{h,t}$ is the simulated Medicare managed care total payment amount,[44] c_t is the IME multiplier, and $[\text{IRB}]_{h,t}$ is the resident-to-bed ratio used for payment purposes (subject to various caps and other adjustments). The a_t and b_t coefficients are annual adjustors for outlier and simulated Medicare managed care payments determined in law.

Table 9-10 shows the legislated changes in the IME multiplier (c_t) and the proportions a_t and b_t on outlier and simulated Medicare managed care revenues, respectively, over the 1997-2002 period. The IME multiplier declines over time according to original BBA legislation as modified by subsequent legislation. The outlier adjustor of 1.0 prior to the BBA indicates full IME add-on payment to any outlier payments. This add-on was completely eliminated in the post-BBA period. The rising managed care adjustor reflects the phase-in of IME payments for any MMC discharge. Beginning in 1998, hospitals received 20 percent of the add-on payment. By January 2002, the MMC add-on was fully phased in.

Our analysis of the BBA is limited by the availability of Medicare Cost Reports to the CY1996 - 2001 period, implies the following changes in the three components:

- IME (1.60 - 1.89 = -.29)
- MMC (0.80 - 0.00 = +0.80)
- Outlier (0.00 - 1.00 = -1.00)

The IME multiplier declined 29 points, implying a 15 percent decline in IME payments if Medicare volumes, case mix, and the other two components had not changed. Hospitals with MMC contracts would have seen their payments for MMC days rise from zero to 80 percent of their ultimate amount. All hospitals lost any IME add-ons to outlier payments as a consequence of the BBA. Current IME revenues on the cost report automatically include changes in these three factors with varying impacts on teaching hospitals. The estimated IME revenues assume no change in the three components since 1996, and are weighted by current year values for Medicare discharges and the IRB to be consistent with current IME revenues.

The BBA also mandated a cap on the number of residents (equal to the 1996 level) that a hospital may use for computing its IME payments. However, as discussed above, there were a number of exceptions established that enabled hospitals to receive payment for more residents than they had in 1996. Using a current year IRB incorporates the effects of both the resident cap and any special exceptions.

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[44] The amount a hospital receives for a beneficiary enrolled in a Medicare managed care plan (known over time as Medicare HMOs, Medicare+Choice plans, and Medicare Advantage plans) is set through negotiations between plans and hospitals and not reported. However, using the encounter data reported by plans, CMS can simulate the amount the hospital would have received had the beneficiary instead been enrolled in the traditional fee-for-service program.

Table 9-10
IME multiplier, outlier, and Medicare managed care adjustors mandated by the BBA and BBRA, 1997–2002

For Discharges Occurring	Outlier Adjustor (a_t)	Managed Care Adjustor (b_t)	IME Multiplier (c_t)
Before October 1, 1997	1.0	0.0	1.89
October 1, 1997 to December 31, 1997	0.0	0.0	1.72
January 1, 1998 to September 30, 1998	0.0	0.2	1.72
October 1, 1998 to December 31, 1998	0.0	0.2	1.60
January 1, 1999 to December 31, 1999	0.0	0.4	1.60[1]
January 1, 2000 to September 30, 2000	0.0	0.6	1.60[1]
October 1, 2000 to December 31, 2000	0.0	0.6	1.54
January 1, 2001 to March 31, 2001	0.0	0.8	1.54
April 1, 2001 to September 30, 2001	0.0	0.8	1.66
October 1, 2001 to December 31, 2001	0.0	0.8	1.60
January 1, 2002 to September 30, 2002	0.0	1.0	1.60
On or after October 1, 2002	0.0	1.0	1.35

NOTE:

[1] For discharges occurring between October 1, 1999 and September 30, 2000, inclusive, the IME multiplier technically was equal to 1.47. However, teaching hospitals received an extra payment equal to the difference between what their IME payments would have been had the multiplier been equal to 1.6 and what they actually received. As a result, the IME multiplier during this period effectively equaled 1.6.

SOURCE: Federal Register, selected years.

The Direct GME payment is determined by a separate formula is equal to

$$(9.2)\quad [\text{DME}]_{h,t} = \left(\frac{[\text{MDays}]_{h,t} + b_t \times [\text{MMC Days}]_{h,t} / n_t}{[\text{Inpatient Days}]_{h,t}} \right) \times \left[\left(\text{PCRES}_{h,t} \times \text{PCA}_{h,t} \right) + \left(\text{SPRES}_{h,t} \right) \times \left(\text{SPA}_{h,t} \right) \right]$$

where MDays $_{h,t}$ and MMC Days = Medicare inpatient FFS and MMC days, n_t = the ratio of the difference of the aggregate Medicare managed care direct GME payment and the Medicare managed care nursing education pool to the aggregate direct GME payment, $\text{PCRES}_{h,t}$, $\text{SRES}_{h,t}$ = primary care and specialty FTE residents, and $\text{PCA}_{h,t}$, $\text{SPA}_{h,t}$ = the adjusted allowable per-resident amount for primary care and specialty residents.

The BBA and BBRA made several changes in the DME payment formula. Besides caps on the sum total of specialty and primary care residents, there was the phase-in for Medicare managed care patient days. The BBRA then imposed ceilings and floors on the per-resident amounts equal to 140 percent and 70 percent, respectively, of the Geographic Practice Cost Index-adjusted national average per-resident amount. Hospitals with per-resident amounts above the ceiling did not receive the annual CPI-U update to their per-resident amounts. Hospitals with per-resident amounts below the floor had their per-resident amount immediately increased to the floor amount. Consequently, hospitals at the ceiling received lower DME payments and vice-versa for those below the floor.

In summary, the current year bite is calculated as the difference between actual and estimated IME or DME payments:

(9.3) $\mathrm{BITE}_{h,t} = (\mathrm{IME}_{h,t} - \mathrm{E}[\mathrm{IME}_{h,t}]) + (\mathrm{DME}_{h,t} - \mathrm{E}[\mathrm{DME}_{h,t}])$

where IME, DME = actual payments, and E[IME], E[DME] = estimated payments in the absence of any GME payment reductions. Actual versus estimated payments vary year-to-year with changes in residents, outlier and MMC payments, the multiplier, the IRB, and the per-resident DME amounts. Both payment amounts in any given year, however, are weighted by current total Medicare discharges, case mix, and beds.

A trimming algorithm was used to delete aberrant observations where:

- The actual reported IME or DME payment on the cost report differed by a factor of 2 (more than 100 percent above or 50 percent below) from what would be calculated using the payment formulas in the text, or

- The calculated change would increase or decrease the reported IME or DME payment by a factor of 10 or more (more than 900 percent above or 90 percent below).

Although these trim thresholds may seem too wide to eliminate reporting errors, alone, inspection of outliers showed several hospitals whose payments truly were substantially affected by either the elimination of IME outlier add-ons or the inclusion of payments for MMC inpatient days.

9.8.2 Trends in Current Year GME Payment Reductions

Tables 9-11 and 9-12 provide estimates of the average payment reduction in IME and total GME payments incurred by teaching hospitals over the 1998-2001 period when the BBA, BBRA, and BIPA rules were in full effect. The figures for IME reductions in the tables are based on set of teaching hospitals trimmed for very high or low margins implying errors in reported revenues or costs. Percents and per resident amounts are weighted by hospital revenues or by number of residents. Figures for overall GME reductions are based on fewer hospitals due to many extreme DME values reported in hospital cost reports. Therefore, figures in the two tables are not strictly comparable.

Table 9-11
Trends in current year IME payment reductions[1] as a percent of revenues and per resident, 1998 - 2001

Year	Total[2] ($000s)	Percent of [3]			Per Resident[5]
		Patient Revenues	Total Facility Revenues	PPS Revenues[4]	
1998	-1,023	-0.61%	-0.55%	-2.39%	-$14,271
1999	-1,173	-0.67	-0.60	-2.67	-15,995
2000	-1,251	-0.66	-0.59	-2.66	-16,413
2001	-1,249	-0.61	-0.55	-2.49	-16,185
Cumulative	$4,889				

NOTES:
[1] IME reduction calculated as difference between annual IME payments minus 1996 IME payments.
[2] Based on approximately 1,030 - 1,060 hospitals, depending on year. Excludes hospitals with reported patient operating margins below -50 percent or above +34 percent (5 percent of hospitals).
[3] Percents weighted by hospital patient or total facility revenues.
[4] Includes outlier and pass-through payments.
[5] Weighted by number of hospital residents.

SOURCE: Medicare Cost Reports, Worksheets S-3, G; mcrdata44c.

Table 9-12
Trends in current year GME payment reductions[1] as a percent of revenues and per resident

Year	Total[2] ($000s)	Percent of [3]			Per Resident[5]
		Patient Revenues	Total Facility Revenues	PPS Revenues[4]	
1998	-1,046	-0.60%	-0.53%	-2.4%	-$12,834
1999	-1,187	-0.63	-0.54	-2.7	-14,060
2000	-1,184	-0.58	-0.51	-2.7	-13,307
2001	-1,290	-0.58	-0.52	-2.5	-14,005
Cumulative	-5,097				

NOTES:
[1] IME reduction calculated as difference between reported annual GME payments minus 1996 GME payments.
[2] Based on approximately 800-900 hospitals, depending on year. Excludes hospitals with reported patient operating margins below -50 percent or above +34 percent (5 percent of hospitals) as well as hospitals with extreme DME values.
[3] Percents weighted by hospital patient on total facility revenues.
[4] Includes outlier and pass-through payments.
[5] Weighted by number of hospital residents.

SOURCE: Medicare Cost Reports, Worksheets S-3, G; mcrdata44c.

The “current” IME loss averaged $1 million per hospital in 1998. The loss increased slightly in 1999 and 2000 before leveling off in 2001 at $1.25 million. The cumulative average hospital loss over the first four post-BBA years was slightly less than $5 million. Total GME annual reductions that include DME payments are only slightly larger than for IME payments alone.

Annual IME and GME reductions averaged only about 6-tenths of 1 percent of total patient revenues in teaching hospitals. The GME loss as a percent of all revenues peaked in 1998 before declining as teaching hospital revenue growth exceeded the small increase in GME revenue losses. By 2001, the average GME reduction was only slightly more than one-half of one percent of total facility revenues (Table 9-12). As Medicare PPS revenues are a minor fraction of teaching hospital revenues, on average, the GME reduction averaged slightly over 2.5 percent of PPS revenues. The average reduction on a per resident basis was roughly $14,000 based on about 900 hospitals with usable data in 2001. The $16,185 estimate for IME reductions per resident are probably more accurate as they are based on a 20 percent larger sample of hospitals with reasonable IME data.

9.9 Decomposition of IME Payment Reductions

The BBA and BBRA mandated a number of changes to the IME payment formula. We decomposed the IME bite by computing estimated ratios of the three IME payment components: 1) payment base: IME multiplier; and the IRB. The ratio of the post-BBA to pre-BBA IME bite in hospital (h) in year t can be expressed as the multiplicative ratio of three components:

$$\text{(9.4)} \quad \frac{\text{IME}\left(post-BBA\right)_{h,t}}{\text{IME}\left(pre-BBA\right)_{h,t}} = \frac{\text{PPS}_{h,t}}{\text{PPS}_{\text{h,o}}} x \frac{\text{C}_{\text{t}}}{1.89} x \frac{\text{IRB}_{h,t}}{\text{IRB}_{\text{h,a}}}$$

where $PPS_{h,t}$ = actual PPS inlier and managed care payments made in year t; $PPS_{h,o}$ = only inlier and outlier payments in baseline year 1996 (excluding managed care IME payments); C_t = the current year IME multiplier; $IRB_{h,t} = (1+IRB_{h,t})^{.405} - 1$ in year t using allowable residents; and $IRB_{h,a}$ = the same IRB formula using the hospital’s actual total residents if they exceed allowable residents. The PPS payment ratio upon which the IME adjustment is based will be less than 1.0 due to the elimination of outlier IME payments if it exceeds the additional IME payments due to carve-out managed care payments, and vice-versa. The legislated decline in the multiplier factor is captured in the second term. The third, IRB, term should also be less than 1.0 for hospitals with residents that exceed their resident cap.

We computed the logarithm of the IME post/pre-BBA payment ratio as well as the three component ratios, and the computed the means of these logged quantities. Exponentiating the mean logged quantities yields their geometric means, which have the property that the product of the component ratios equals the geometric mean of the overall IME bite ratio. ***Table 9-13*** shows this decomposition for the current year IME bite, or payment reduction.

Table 9-13
Decomposition of the effect of the BBA and BBRA changes on IME payments

	Geometric Mean Bite Ratio			
Year	Payment Base	Multiplier	IRB-Related	Total
1998	0.953	0.879	0.969	0.812
1999	0.978	0.842	0.971	0.800
2000	1.011	0.835	0.962	0.812
2001	1.033	0.847	0.952	0.833

NOTE: Bites for 1997 not shown because of data reporting problems.

SOURCE: Derived from Medicare Cost Reports; Program mcrdata46a (alarsen 5/4/2005)

In 1998, the total geometric mean IME bite ratio of 0.812 implies an 18.8 percent IME payment reduction. The reduction in the multiplier contributed 12.1 percentage points (100 × [1 – 0.879]), or about two-thirds, of the current year IME bite. By 2001, the decline in the multiplier accounted for nearly all of the IME bite.

The payment base average bite effect was negative in 1998, contributing 4.7 percentage points of the overall 18.8 percent IME bite. However, as Medicare managed care payments were phased-in, the IME payment base bite became positive, offsetting the overall IME bite by 3.3 percentage points.

The IRB-related portion of the IME bite actually became slightly more negative over time, from –3.1 percent to –4.8 percent. This impact is felt by hospitals with resident counts above their cap for which they received no extra IME add-on payments. Hospitals with fewer residents than their cap felt no impact from this provision.

9.10 Medicare’s Teaching Hospital Subsidy

In this section, we quantify the amount of IME and DME subsidy that Medicare pays teaching hospitals. These subsidies are debited against resident salaries to show the marginal net cost of hiring another resident.

9.10.1 Simulation Methods

Additional Medicare DME and IME payments to teaching hospitals to cover residents’ costs greatly reduce the net cost of employing them. The net marginal wage of an additional resident facing a teaching hospital can be written as[45]

(9.5) Resident’s Effective Net Wage $= W_r[\ 1 - DME - IME\ ]$

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[45] See Appendix 3.A for mathematical derivation of the net wage equation.

where

(9.6) $\text{DME} = (1+s)\text{PDS}_m$

(9.7) $\text{IME} = (\text{FR}/\text{W}_r)\,(\text{Q}_m/\text{B})(.765(1+\text{IRB})^{-.595})$
$\quad = (\text{FR}/\text{W}_r)\,(\text{PDS}_m/\text{ALOS}_m)\,(365{*}\text{OCCR})\,(.765(1+\text{IRB})^{-.595})$.

The [1-DME-IME] term in (9.5) can be considered a Medicare resident wage adjustment factor. The smaller the adjustment, the lower is the effective net annual wage that teaching hospitals incur. Medicare's marginal DME subsidy equals Medicare's share of patient days, PDS, times (1 + s) = the add-on factor accounting for the allowable cost of teaching programs. Embedded in "s" in the cost report are the fringe benefits paid residents, e.g., FICA, vacation (AAMC, 2004), as well as the contractual costs of teaching faculty and program managers. The IME marginal subsidy depends positively on (FR/W_r) = the ratio of the hospital's federal rate to the average annual resident wage, Q_m = total Medicare discharges, and the rate of change of the IRB add-on to Medicare DRG payment from adding an additional resident = $(.765(1+\text{IRB})^{-.595})/\text{B}$, where B = bedsize. The marginal IME add-on factor is weighted by total Medicare outlays, FR x Q_m, then divided by the resident's wage which converts the absolute dollar IME subsidy into a proportion of the wage.

The ratio, Qm/B, can be decomposed into three factors that contribute to higher or lower IME subsidies. The Medicare share of days and the hospital's occupancy rate increase the subsidy because of more Medicare patients. Longer average Medicare stays for a given total number of inpatient days imply fewer discharges and less IME payments.

9.10.2 Illustrative Simulation

Table 9-14 displays simulated resident wage adjustment factors that correspond to the bracketed term in (9.5) above. Sensitivity analysis is performed on differences in PDS, s, FR/W_r, and the IRB ratio. Results are based on a teaching hospital with a 75 percent occupancy rate, an average annual resident wage of $40,000,[46] and a Medicare average length of stay of 8 days. The $40,000 stipend excludes roughly 25 percent in fringe benefits (AAMC, 2004). Also, the simulation assumes no additional faculty costs to adding a single resident.

The preponderance of negative adjustment factors in the table implies that the effective marginal resident wage is likely to be less than zero for the majority of teaching hospitals.

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[46] According to the AAMC (2004), the PGY1 mean resident stipend was $40,788 rising to over $48,000 for a PGY-4 resident. This figure excludes fringe benefits.

Table 9-14
Simulated IME and DME adjustment factors to resident nominal wage rates

IRB Ratio	PDS = .2				PDS = .4				PDS = .6			
	S = .3		S = .7		S = .3		S = .7		S = .3		S = .7	
	FR/W_r		FR/W_r		FR/W_r		FR/W_r		FR/W_r		FR/W_r	
	1:8	1:4	1:8	1:4	1:8	1:4	1:8	1:4	1:8	1:4	1:8	1:4
.10	+0.12	-.50	+.04	-.58	-.76	-2.0	-.92	-2.2	-1.6	-3.5	-1.9	-3.7
.25	+.17	-.41	+.09	-.49	-.66	-1.8	-.83	-2.0	-1.5	-3.2	-1.7	-3.5
.50	+.23	-.29	+.15	-.37	-.55	-1.6	-.71	-1.7	-1.3	-2.9	-1.6	-3.1

NOTES:
PDS = Medicare share of inpatient days and resident fringes.
S = Ratio of total teaching faculty costs to resident salaries.
FR/Wr = Hospital wage and casemix-adjusted Federal Rate divided by resident annual wage.
Numbers in table based on Effective Wage Adjustment Formula:
[1-PDS(1+S)-(FR/Wr)(365*OCCR/ALOSm)(.765(1+IRB)-.595)]
with parameters: Resident annual wage (Wr)=$40,000; hospital occupancy rate (OCCR)=.75; average Medicare length of stay ($ALOS_m$)=8;

SOURCE: RTI simulation.

Consider a typical teaching hospital with 40 percent Medicare days, PDS = .40, a teaching faculty cost loading factor s = .30, and on a case-mix adjusted federal DRG rate 1/8th of the resident's wage. This hospital would enjoy a negative wage adjustment factor ranging from -.76 to -.55 depending upon the hospital's IRB ratio, or teaching intensity. By filling an empty resident slot, the teaching hospital would receive a combination of DME and IME payment subsidies that would exceed the nominal wage of $40,000 by 55 to 76 percent. For the teaching hospital with an IRB = .10, the -76 percent factor is composed of a 52 percent reduction due to the DME subsidy and a 124 percent reduction due to the IME subsidy. The large IME adjustment is based on the marginal increase in IME payment that applies to all Medicare discharges. The DME subsidy nets the hospital $20,800 while the IME subsidy nets $49,480.

The simulation table shows a very narrow range of parameters that produce a positive adjustment factor and a positive resident wage facing the hospital. Facilities with a low share of Medicare days and a low federal rate relative to the average resident annual wage, combined with a high an IRB, would incur a positive wage.[47] The effective wage quickly becomes negative with increases in (a) the Medicare share of days beyond 20 percent, and (b) the Medicare federal rate relative to the resident's wage. Negative marginal resident wages are maximized for hospitals with high Medicare shares of days and federal rates combined with low

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[47] Higher IRBs actually generate lower marginal subsidies because of the non-linear IRB add-on formula.

IRBs. The -3.7 adjustment factor at the upper right corner of the table implies an effective net wage of -$149,200, composed of a $40,000 nominal wage minus a $40,800 DME subsidy minus a $148,400 IME subsidy. Medicare's DME subsidy, alone, pays entirely the new resident's wage given the 70 percent add-on for related teaching costs and the 60 percent Medicare days. The IME subsidy is even far larger due to the increase in the IRB ratio spread across several thousand Medicare discharges at an average federal rate of $10,000. Consequently, hospital financial managers, even before considering the value of residents in caring for patients (not to mention their value to teaching program managers), likely regard additional residents as better than a "free input" and a "line-of-business" in most facilities.

9.10.3 Actual Medicare Subsidies and Effective Resident Wage in 2001

We estimated the actual DME and IME subsidies and resident effective wage for all teaching hospitals in our data base for 2001. The DME marginal subsidy was derived by multiplying Medicare's share of total inpatient days by the DME total allowable amounts per resident. The latter incorporates both the residents' salaries plus any faculty teaching-related costs. We constrained the per resident amount to $160,000, or four times the estimated average resident's salary due to unrealistic outliers.[48] The IME subsidy was derived by inserting the ratio of total inpatient PPS payments per bed and the hospital's IRB into the IME formula (9.7). All DME and IME dollar figures are based on an assumed $40,000 annual stipend, or salary, increased by a 25 percent fringe factor. The most recent estimate of the PGY1 stipend is $40,788 (AAMC, 2004). Resident fringe benefits average 25 percent,[49] which would decrease the effective wages by a similar percentage. Moreover, hospital allowable per resident amounts are based on data from the 1990s trended forward by the CPI. The allowable amounts, therefore, may bear little relation to current "costs of teaching" residents. In addition, the IME payment add-on is not debited for any additional institutional patient care costs, e.g., more tests, and long operating room surgeries and inpatient stays. Adding 1-2 residents should have minimal effects on patient care costs — especially in larger programs. The analysis also assumes that the hospital is not constrained by Medicare's cap on residents.

Table 9-15 displays mean and percentile thresholds for both subsidies as of 2001. Across roughly 1,000 teaching hospitals, the average DME subsidy was $28,454, which is approximately 70 percent of the resident's base stipend. Of course, some of this subsidy covers extra teaching costs for an additional resident. The average IME subsidy is nearly 3-times as much, $78,424, for a total subsidy of $106,878. After debiting the $40,000 salary plus 25 percent fringes, the net effective marginal resident wage is estimated to be -$57,236, implying a wage adjustment factor of -1.14 based on a fringe-adjusted $50,000 stipend. For the average teaching hospital, filling another resident slot would generate an estimated $106,878 in Medicare revenues alone, a figure 2.1 times greater than the additional resident's annual wage cost to the hospital.

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[48] While most faculty cost loading factors range from 20% to 50%, a few hospitals have ratios well above 100% due to the special way that such costs were accounted for when the DRG payment system was established.

[49] Fringe benefits include: group medical and dental insurance, life and long-term disability insurance, housing, meals, parking, holidays and vacation, personal days, and educational seminar days.

Table 9-15
DME and IME subsidies and marginal effective wage per resident, 2001

	Subsidy			
	DME[1] (989)[4]	IME[2] (1,058)[4]	Total	Marginal Effective Wage[3] (989)[4]
Mean	$28,454	$78,424	$106,878	-$57,236
Top 10%	48,966	118,000	166,966	-107,935
Top 25%	36,971	99,869	136,840	-85,178
Median	26,564	78,940	105,504	-57,305
Bottom 25%	18,093	56,349	74,442	-28,870
Bottom 10%	10,763	33,472	44,235	-2,982

NOTES:

[1] DME subsidy = Medicare share inpatient days x DME allowable payment per resident (constrained to allowable/resident <$160,000).

[2] IME subsidy = Medicare inlier DRG and M+C carve-out payments x the IRB derivative = 7.65(1 + IRB) - $^{-.595}$.

[3] Effective wage = $40,000 + 25% fringes - DME subsidy - IME subsidy.

[4] Number of reporting hospitals.

SOURCE: Simulated based on IPPS Medicare Cost Reports for teaching hospitals, 2001; bscott/08512.001/bitej05/8.19.05.

Gains to hiring the marginal resident vary greatly depending upon the factors mentioned above. The top 10 percent of teaching hospitals would gain at least $166,966, implying a negative marginal wage of -$107,935. The bottom 10 percent of hospitals would enjoy a subsidy of $44,235 or less. According to our calculations, less than 20 percent of teaching hospitals would actually face a positive marginal resident wage. The other 80 percent or more would experience a negative wage and consider the resident a "more-than-free" input *at the margin.*

Table 9-16 decomposes the subsidies and effective wage by several hospital characteristics. The Medicare subsidy rises dramatically with the share of Medicare inpatient days. Teaching hospitals with over 40 percent of their inpatient days covered by Medicare enjoy a subsidy 2.7- times as great as hospitals with less than 20 percent Medicare days. The actual number of residents, however, is inversely correlated with Medicare share of days, thereby reducing the total subsidy to the industry as a whole. Moreover, roughly half of teaching hospitals had greater than 40 percent Medicare days along with below-average resident counts.

Average hospital subsidies generally decline with higher IRB ratios but only for ratios above .25. The marginal IRB effect is always less as the IRB rises. Therefore, the relatively constant subsidy at IRBs less than .25 is due to higher Medicare shares of discharges and federal rates per discharge.

Table 9-16

DME and IME average subsidies and marginal effective wage per resident by hospital characteristic, 2001

Hospital Characteristic (N. Hosp)[4]	DME[1]	Subsidy IME[2]	Total	Marginal Effective Wage[3]	Average Residents[5]
Medicare Share of Days					
<20% (95)	$7,816	$39,308	$47,124	-$2,272	121.9
20-40% (391)	22,964	67,838	90,802	-41,520	130.1
40+% (573)	35,736	92,114	127,850	-78,157	34.2
IRB Ratio					
<.05 (304)	28,351	82,555	110,906	-61,409	6.0
.05-.10 (192)	31,689	85,672	117,361	-68,130	19.0
.10-.25 (250)	29,905	82,506	112,411	-63,130	47.8
.25-.40 (123)	29,998	77,927	107,925	-58,274	102.6
.40+ (188)	22,644	59,887	82,531	-32,720	276.5
Ownership					
Private Voluntary (797)	30,782	86,319	117,101	-67,452	72.9
Government (54)	18,920	42,407	61,327	-10,442	135.5
Proprietary (131)	23,998	62,772	86,770	-36,231	29.7
Location					
Urban (990)	28,106	78,560	106,666	-56,862	81.8
Rural (69)	33,558	76,470	110,028	-62,731	15.4
State					
South Dakota (2)	58,172	96,596	154,768	-104,768	14.2
Montana (3)	29,666	95,354	125,020	-103,881	5.6
Rhode Island (4)	36,454	103,527	139,981	-89,981	139.8
Mississippi (3)	14,224	59,136	73,360	-21,174	118.7
Louisiana (23)	15,567	50,986	66,553	-16,553	63.5
Nevada (3)	12,663	51,949	64,612	-14,613	41.3
New York (101)	33,836	69,298	103,134	-53,328	145.3

NOTES

[1] DME subsidy = Medicare share inpatient days x DME allowable payment per resident (constrained to allowable/resident <$160,000).

[2] IME subsidy = Medicare inlier DRG and M+C carve-out payments x the IRB derivative = $7.65(1 + \text{IRB})^{-.595}$.

[3] Effective wage = $40,000 + 25% fringes - DME subsidy - IME subsidy

[4] Number of reporting hospitals.

[5] Average actual residents per hospital.

SOURCE: Simulated based on Medicare Cost Reports for Teaching Hospitals 2001; Larsen hosp 04.

Medicare subsidies were lowest for government hospitals. This is due to their relatively low share of Medicare days and discharges.

Rural teaching hospitals, about 7 percent of all teaching hospitals, actually enjoy a slightly higher Medicare subsidy per resident and more negative effective resident wage, in part due to a higher share of Medicare days.

The last panel of Table 9-16 shows the three states with the highest and lowest Medicare marginal effective resident wage. The two reporting teaching hospitals in South Dakota enjoyed an average Medicare subsidy of over $154,000 with a negative marginal resident wage of -$104,768. They averaged only 14 residents, however. Rural Montana also enjoyed substantial subsidies per resident. Rhode Island, the most urban state in the union, had the third most negative wage along with very large resident programs, on average. Two southern states, Mississippi and Louisiana, had two of the three least negative marginal wages due to relatively low subsidies. The three teaching hospitals in Nevada had the least negative marginal wage (-$14,613) due primarily to their low shares of Medicare days and discharges. New York's 101 reporting teaching hospitals received a Medicare subsidy per resident of slightly over $100,000. This was about average for the country.

9.11 Impact of GME Payment Reductions on Resident Demand

In this last section, we address the question of the impact that the BBA and BBRA reductions in GME payments had on resident demand in teaching hospitals, nationally.

9.11.1 Methods & Data

To quantify the payment reduction effects on hospital residents, we specify and estimate an Ordinary Least Squares regression. The initial sample is all U.S. hospitals with residents as of 2001 with deletions for missing data points as discussed below. The dependent variable is the percent change in the number of *actual* residents (medical and dental) as reported on Worksheet S-3 of the Medicare Cost Report between 1996 and 2001, a 5-year period. This resident count will exceed allowable residents for teaching hospitals that exceed their resident cap in 2001 (no cap was in effect in 1996). We explain the growth (decline) in residents that the hospital actually takes on over the period rather than allowable residents because (a) hospitals can and do exceed their cap, and (b) some hospitals may continue to expand their residency programs in spite of the payment rollbacks.

The explanatory variables in the model are grouped in five domains:

Hospital characteristics:

- Ownership (CTRLGRP2)
- Member, Council of Teaching Hospitals (COTH)
- Teaching intensity (major > .25; non-major < .25) (TEACH)

Area Characteristics:

- Rural location (rural, urban)(RURAL)
- Census Division (9 regions)(CENSUS_DIV)
- Population % growth rate (statewide, 2000-2002)(POPGRW)

Residency program size:

- Total residents (5 groups: <=5, 6-10, 11-20, 21-70, 71+)(SMLLGRP2)

GME payment reductions, 1996-2001:

- IME % reduction per resident (TIMEBSRES)
- IME % reduction per patient revenues (DIMEBSREV)
- GME % reduction per patient revenues (DGMEBSREV)
- Marginal net effective resident wage (positive; 0-(-$70000), <-$70000) (WAGEGRP2)

Hospital volume level & change:

- Occupancy rate (1996)(OCCRAT)
- Change % in total inpatient days, 1996-2001 (DDAY9601)

Ownership, COTH, and major teaching intensity are included to proxy for hospital preferences for residents. Private voluntary and government hospitals are predicted to have stronger preferences for residents than proprietary hospitals. The same should be true of major teaching and COTH hospitals.

Rural hospitals were allowed to raise their GME resident caps for new programs and affiliations more easily and should show stronger resident growth post-BBA. Some Census areas and states have experienced stronger population growth and should have greater continued demand for residents.

Resident program size groups are included to control for the highly non-linear percentage changes in residents for small versus large programs. A hospital that goes from 1 to 2 residents between 1996 and 2001 has a 100 percent increase versus another hospital with 100 residents that would experience only a 1 percent increase per additional resident.

The GME payment reduction variables are all prospective "bite" measures forecasted forward from 1996 to 2001 (see Appendix 9.C for derivation of formulas). We seek a payment rollback measure, in dollar terms, that hospital financial managers faced in the year that the BBA legislation was passed. The larger this bite measure, the stronger should have been the incentive to reduce residents. The bite is more negative for hospitals expecting to lose more GME payments because of the elimination of outlier GME add-ons. The bite is less negative for hospitals expecting to gain more from Medicare managed care carve-out GME payments. The DME portion of the overall GME bite is more negative for hospitals above the per resident ceiling amount and vice-versa, for those hospitals below the floor. All hospitals experience a negative bite from reductions in the IME multiplier. All of these legislated differences between the 1996 base year and 2001 are multiplied by baseline 1996 values for PPS payments, IRB ratios, and primary/specialist resident counts. This weighting assumes that managers do not predict how these values will change of the next several years. Therefore, our bite measures do not include any responses by hospitals in terms of reduced Medicare volumes, etc. Actual volume changes are captured by other variables in the model (and presumed outside the hospital's control).

Based on the simplified model of hospital behavior in Section 3, most teaching hospitals face a negative marginal effective resident wage. So long as the marginal wage remains negative, adding residents can still be financially rewarding to hospitals, especially if they are also able to raise their resident cap. But even if they are operating under a "hard cap," hospitals enjoying a large negative wage are unlikely to lower their resident demand with "small" GME payment rollbacks. By contrast, hospitals already facing a positive wage should be less likely to add new residents. Conversely, hospitals experiencing substantial volume decreases should reduce resident counts due to RRC-imposed constraints.

Hospitals with high occupancy rates and/or experiencing greater increases in inpatient days should continue to have a strong demand for residents in spite of the GME payment reductions. Conversely, hospitals experiencing substantial volume decreases should reduce resident counts due to RRC-imposed constraints.

Table 9-17 gives regression results for three models explaining hospital growth in actual residents between 1996 and 2001. Model (1) includes only the hospital and area characteristics. Model (2) steps in the IME payment bite per resident, program size, and inpatient volume variables. Overall explanatory power is 18.5 percent in Model (2). Many of the variables are statistically significant. Both IME payment bite coefficients are significant. Together they imply a positive relationship with resident changes. Hospitals facing a smaller, more positive, bite increased their residents more than those facing a potential large IME payment reduction.

Table 9-18 evaluates the percent change in residents for several values of the expected IME bite. As the bite becomes more negative the rate of growth or residents declines and actually becomes negative at a bite of -$30,000 per resident.

The mean bite for the model was -$9,000, which is associated with continued positive resident growth. Only when the prospective bite becomes roughly three-quarters of the resident's average annual salary ($30,000/$40,000) does resident growth turn negative.

Hospitals facing a negative marginal wage exhibit higher resident growth than those few hospitals with a positive marginal resident wage (i.e., the reference group). For example, hospitals with a negative marginal wage below -$70,000 increased residents at 9.2 percentage points relative to those facing a positive wage.

Both volume variables positively impact revenue growth. Hospitals with higher occupancy rates in 1996 continued to add residents. A 10-point higher baseline occupancy rate (e.g., 60% to 70%) is associated with a .034 percentage point increase in resident growth (mean resident growth = .071).

Table 9-17
Models of resident growth: econometric results

	Dependent variable: % Change residents, 1996 -2001		
Explanatory Variable	(1)	(2)	(3)
Intercept	.174*	-0.152	-0.159
Control			
Proprietary	-.059	-.085*	-.070
Government	-.030	.011	.004
COTH	.004	-.028	-.025
TEACH (major)	.009	.115***	.141***
Rural	-.185**	-.084	-.093
Census area (nonSouth)	-.064**	-.095***	-.089***
Population Growth (%)	.010	.014**	.010
Program Size			
< = 5		.903***	.896***
6-10		.400***	.355***
11-20		.238***	.231***
21-70		.122***	.105***
GME Reductions (Bite)			
timebsres/1000		.0029***	
timebsres^2		-.000016**	
dgmebsrev		--	4.36***
dgmebsrev^2		--	-79.37**
wagegrp2 (0 - (-$70,000))		.058**	.045
wagegrp2 (< - $70,000)		.092**	.061
Hospital Volumes			
Occupancy Rate (%)	.166**	.321***	.340***
Inpatient days (% change)		.226***	.230***
R^2	.022**	.185***	.160***
DOF	808	791	776

NOTES: See text for variable definitions.

SOURCE: Medicare Cost Reports, 1996-2001; Population growth: *Statistical Abstract*, No. 18, 2003; COTH: AAMC COTH membership list. Rural: CMS Impact files.

Table 9-18
Simulated IME bite & resident growth

TIMEBSRES[1] ($000)	Percent Change in Residents, 1996-2001
+20	.157
+10	.132
+2	.111
0	.105
-2	.099
-10	.074
-20	.041
-40	-.037

NOTE:

[1] Expected annual reduction in IME payments per resident.

SOURCE: Simulation based on TIMEDSRES regression coefficient for inpatient days %. Table 9-17, col. 2.

Proprietary hospitals exhibit lower resident growth relative to private voluntary hospitals holding other variables constant. Major teaching hospitals and hospitals in the South Region exhibit higher average resident growth. COTH, government, and rural hospitals do not exhibit differential resident growth holding other variables constant.

Model (3) substitutes overall GME bite per dollar of patient revenue for the IME bite. The impacts are qualitatively the same as with the IME bite per resident. As the prospective negative bite becomes larger as a proportion of revenues, the growth in residents declines as well. If the bite increased by .001 (slightly less than 20 percent of the mean bite of -.0057), the percent change in residents declines by 4.35 percentage points.

Marginal wage impact on resident demand is not robust to the bite measure used, as evidenced by the insignificant WAGEGRP coefficients in Model (3). (WAGEGRP < -$70,000 was significant at the 11% level.) Most of the other coefficients were unaffected by the switch in GME bite measure.

9.12 Key Findings

Below is a summary of key findings (Exhibit 9-3) regarding the growth in residents and financial impacts on teaching hospitals.

Exhibit 9-3
Key findings: Resident trends, teaching hospital finances, & BBA payment reductions

Trends in Residents	1. Actual residents on cost report increased 14,000 from 1990-2001 2. Actual residents increased over 6,000 since post-BBA-2001 3. Medicare adjusted resident cap increased 9% post-BBA-2001;33% in rural areas 4. Allowed residents increased 4% post-BBA-2001; 16% in rural areas 5. Two-thirds of hospitals constrained by cap in 2001 6. One-sixth of hospitals above and one-sixth below cap
Three-Year Rolling Average	7. Three-in-ten hospitals had either consistently rising or falling resident counts, 1998-2001 8. Increased resident count by 4 residents, or 10%, for declining hospitals 9. Decreased resident count by 5 residents, or 5%, for rising hospitals 10. Saved Medicare 2.6% on IME payments in 2001
Teaching Hospital Finances	11. Patient & Total Revenues grew 8.5% annually, 1985-1996 12. Patient & Total Revenues grew 6.5% annually, post-BBA 13. Operating margins averaged -4%, post-BBA 14. Total margins averaged +3.5% post-BBA 15. Medicare-dependent hospitals had higher operating & total margins 16. Rural, minor teaching, and propriety hospitals had higher margins 17. Government teaching hospitals averaged -9% operating margins post-BBA
BBA Payment Reductions	18. IME payment reductions, post-BBA, averaged 6-tenths of 1% of hospital revenues 19. IME reductions averaged 2.6% of PPS revenues in teaching hospitals 20. Per resident reductions averaged $14-16,000 21. Reductions in the IME multiplier, IRB, and changes in outlier IME and MMC add-ons reduced IME payments 17% in 2001 22. Multiplier reductions explained 15 of 17% percentage points; IRB reductions, 5 points; MMC increases offset outlier reductions and added 3 percentage points
Medicare GME Subsidies	23. DME + IME subsidies averaged $106,878 in 2001 for additional resident 24. Hospitals' effective marginal resident wage = -$67,236 in 2001 25. Medicare-dependent hospital subsidy averaged $127,850 in 2001 26. Government hospital subsidy averaged only $61,327 27. Rural teaching hospitals receive slightly higher subsidy per resident 28. South Dakota and Montana receive highest Medicare subsidies per resident; Louisiana and Nevada receive the lowest state subsidies
Resident Demand & Payment Reductions	29. Hospital resident demand grew faster in facilities with smaller expected losses in GME payments, post-BBA-2001 30. Resident demand remained positive in teaching hospitals except for those facing expected $30,000 subsidy loss per additional resident 31. A 10% increase in inpatient days resulted in 3% increase in resident demand, *ceteris paribus* 32. Major teaching hospitals and hospitals in the South averaged roughly 10 percentage points higher resident growth, post-BBA

SECTION 10
IMG LOCATIONAL PATTERNS POST RESIDENCY

10.1 Policy Background

Internationally trained physicians and international medical graduates (IMGs) in the United States have been perennial subjects in the health services research literature and public debates. Over the years, the nature of the issues addressed in the literature and public debates with regards to these professionals have included their technical skills (quality), their impact on the total supply of physicians, their geographic distribution vis-à-vis U.S. medical graduates (USMGs) and, in the case of IMGs, the burden of their education incurred by U.S. taxpayers (cf., Mick, et al., 2000).

The large increase in medical residents during the late 1980s and early 1990s was one of the sources of Congressional concern about rising Medicare payments for graduate medical education (GME). This was echoed in a Congressional Budget Office report (CBO, 1995) where it was stated that U.S. taxpayers were paying for the graduate medical education of IMGs that were leaving the U.S. after graduation. A 1996 bill passed by Congress to directly reduce the number of GME students (residents) was vetoed by the President. In 1997, in a "Consensus Statement on the Physician Workforce," the American Medical Association (AMA), the Association of Academic Health Centers, and the Association of American Medical Colleges (AAMC), among others, cited "compelling evidence" that an "oversupply of physicians" was imminent. They further recommended that

> [IMG] training should not be financed from Medicare funds currently dedicated for the support of GME, or from any national all-payer GME fund that might be established in the future. It is important that these physicians return to their country of origin after completing GME in this country. (AMA website, 1997).

The Balanced Budget Act of 1997 (BBA) contained GME provisions that placed ceilings on the number of residents and lowered the "multiplier factor" component of Medicare's indirect medical education (IME) payment adjustment. Congress, however, did not adopt the IMG recommendations put forth by the AMA, et al. (1997).

The primary goals of our analysis are to determine the extent to which IMG residents (1) remain in the U.S. after completing their residency; (2) undergo their residency training in poorer areas of states; (3) begin their practice in rural and other areas in which physician access might be a problem; and (4) whether they are choosing specialties perceived to be over/under-supplied.

10.2 Literature Review

10.2.1 Contribution of IMGs to Growth in Residents

The increase in the number of IMGs has been well-documented in the health services research literature (Mick, *et al*., 2000), by AMA researchers (e.g., Brotherton, *et al*., 2004), and RTI and its collaborators (Campbell, *et al*., 2002). Using data presented in the annual medical education issues of the *Journal of the American Medical Association* (JAMA), Campbell, *et al*. (2002) found that while the number of USMGs increased only slightly from 68,900 to 72,100 between 1990 and 2000, the number of IMGs increased from 14,900 to 24,700 over the same period. Thus, IMGs accounted for about 70 percent of the growth in residents during the 1990s. The IMG share of all residents, 18 percent in 1990, averaged 26 percent since 1995, reflecting their extraordinary growth in the early 1990s.

10.2.2 IMG Residency Practice Location

During the mid-1990s, one Congressional concern was that U.S. taxpayers were not obtaining a return on their investment in IMGs because it was perceived that IMGs left the U.S. following completion of GME. The fact is that the majority of IMGs remain in the U.S. after completing their residency (see Section 10.2.3 below). Furthermore, it is widely known that residents provide medical care services during their training. Given difficulties in attracting both attending physicians and USMGs to “safety net” hospitals, advocates have argued to allow IMGs to obtain GME in U.S. hospitals in order to help the service delivery needs of safety-net hospitals.

To ascertain whether IMGs were doing their residency in safety net hospitals, Whitcomb and Miller (1995) classified 688 hospitals that were the principal teaching sites for residency programs. Of the 688 hospitals, 107 were classified as IMG dependent (at least 50 percent IMGs) during the 1993-94 academic year. Hospitals were classified as “disproportionate share hospitals” if 20 percent or more of their patients were no-pay or Medicaid/public assistance. Seventy-seven hospitals were classified as both IMG dependent and disproportionate share. Overall, two-thirds of IMGs are residents in “disproportionate share” hospitals.

10.2.3 IMG Post-Residency Practice Location

Not only have the number of IMG residents increased but also the number practicing in the U.S. following completion of their GME. Of the over 500,000 physicians practicing in 1996, nearly a quarter were initially trained abroad (Mick, et al., 2000). Politzer, Cultice, and Meltzer (1998) found that IMGs contributed to what they refer as a worsening imbalance in the geographic distribution of physicians. Specifically, Gini indices for total patient care physicians (excluding residents) for both USMGs and IMGs increased between 1989 and 1994, indicating a less even distribution of physicians over 3,082 counties. Similar results were found for both office-based and hospital-based specialists. They found little evidence that IMGs are locating in needy counties. On the other hand, Mick and his collaborators have found that IMGs are both disproportionately locating in “needy” counties and in states with high physician-population ratios (Mick and Lee, 1997; Mick, Lee, and Wodchis, 2000). Whether too many IMGs remain in the U.S. depends, in part, on whether they are locating in underserved areas, as well as whether one believes that a physician surplus or shortage exists or is imminent (Reinhardt, 2003).

Using the economic location model developed by Newhouse, et al. (1982) and a conditional logit multivariate approach, Polsky, et al. (2002) found that new foreign-born IMGs were more likely to locate in areas where their had performed their residency, in areas with established IMGs, and in areas with populations that are racially and ethnically (black, Asian, and Hispanic) similar to the IMGs. Blacks, Hispanics, and some Asian populations are typically medically underserved. Thus, the findings that new IMGs tend to practice in areas where they performed their residency (see the above discussion of the Whitcomb and Miller [1995] findings) and that they tend to serve immigrant populations strongly suggests that they tend to locate in medically underserved areas.

Our study makes several contributions to the literature and helps inform Medicare policy makers. First, the analysis is based on a unique database developed by linking two Medicare administrative databases: *Intern and Resident Information System* (IRIS) and the *Physician Registry*. This allows us to show the relocation patterns of residents subsidized by Medicare to various states and urban/rural areas. Second, it focuses on the relationship between IMGs and Medicare. The *IRIS* database allows us to determine the location of the teaching hospitals that claim IMGs for Medicare GME payments. Thus, we can describe the incomes and patient characteristics of hospitals where Medicare-subsided residents are seeing patients. Finally, the *Physician Registry* allows us to determine where, after GME completion, IMGs locate their practices that serve Medicare beneficiaries on a fee-for-service (FFS) basis.

10.3 Data Sources and Methods

IMG retention rates and where they begin their domestic practice in the U.S. are determined by matching Medicare's 1998 IRIS database to Medicare's March 2004 Physician Registry that reports each physician's practice setting, if any. All physicians that bill Medicare on a FFS basis are required to have a Physician Registry record. The Bureau of Health Professions' HPSA database was then linked to the merged database showing residents who trained in a HPSA and continued to practice in a HPSA after completing their residency. Socio-economic characteristics of the zip-code areas in which physicians practice were also linked to the merged database.

The 1998 IRIS file was used for the analysis, assuming that the majority of residents would have completed their residency by 2004. The 1998 IRIS file available to us, however, does not contain residents from teaching hospitals in Delaware, Indiana, Maine, Minnesota, Ohio, and South Carolina, as well as several states that each have fewer than 150 residents.[50] The IRIS resident information submitted by hospitals includes social security number, training specialty, undergraduate medical school and year of graduation, the hospital's Medicare provider ID, and the dates spent in each hospital. Some residents serve rotations in more than one hospital. In the event that multiple hospitals claim the same period of resident time, CMS' fiscal

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[50] Table 2 in Appendix II (JAMA, 1999) indicates that there were about 9,500 residents in the 11 states with no IRIS data.

intermediaries determine which hospital can legitimately claim the resident's time. The hospital in which the resident spent the majority of their GME time was considered their main location for training purposes.[51] Residents that attended a foreign undergraduate medical school, according to IRIS, were classified as IMGs. The Physician Registry maintains a unique record of each physician's UPIN, social security number (SSN), undergraduate medical school and year of graduation, the physician's most recent active practice address, and self-designated specialty. Practice settings for which no Medicare FFS claims have been submitted for a year are "deactivated" but otherwise maintained in the registry.[52] Since carriers submit physician earnings statements for income tax filings, the social security numbers on the Physician Registry should be fairly accurate (Adamache, et al., 1994, 1995, 1996, and 1997).

IRIS and Physician Registry records were initially matched using three algorithms: (1) exact SSN matches; (2) exact name match along with a match on "transposed" SSNs; and (3) exact matches on last name, medical school code and graduation year along with a first name matching algorithm.[53] About 5.5 percent of 1998 residents had deactivated (inactive) practice settings. Another 20.5 percent of residents did not have any record in the Physician Registry. An unreasonably high 17 percent of USMGs did not have a Physician Registry record after initial matching.[54] The following types of residents were deleted from the analytic file because they had a low likelihood of having an UPIN record in 2004:[55]

- First and second-year surgical residents, because they were likely to still be in a surgical sub-specialty fellowship in 2004;
- Pediatric, psychiatric, and other "low Medicare billing" sub-specialty residencies; and
- 1,513 other residents that attended non-medical (e.g., dental) schools in the U.S.

10.4 USMG and IMG Active Practice Rates

About 84 percent of USMG residents in 1998 had active Medicare practices six years later in 2004 (***Table 10-1***). Of the 16 percent with no UPIN, 4 percent were inactive and 12 percent did not have any matching UPIN number. The active UPIN rate for IMGs was somewhat less, 72 percent, with 28 percent inactive/unmatched (4 percent inactive; 24 percent

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[51] *JAMA* data indicate that there were 97,383 total residents in 1998 whereas IRIS reported 78,625 residents. JAMA's figures are from a survey of program residency *positions* whereas the IRIS is based on the number of residents claimed by hospitals for Medicare reimbursement. Before unduplicating the residents in the IRIS file, there were 109,844 records in the IRIS file for 1998, implying a 28 percent duplication rate (1-[78,625/109,844]). JAMA would have much less duplication as its counts are derived from program, not individual hospital, reporting.

[52] In the event that an active practice was not available, the deactivated practice setting that was most recently added to the Physician Registry was used.

[53] This last matching method was amended for IMGs by dropping the medical school code criterion because both IRIS and the Physician Registry use the same code of all 9s (99999) for all international medical schools.

[54] Not all USMGs are U.S. citizens and some might have left the U.S. upon completion of GME.

[55] See Appendix 10.A for the initial USMG-IMG counts prior to deletions.

unmatched). It is immediately clear that the vast majority of IMGs are remaining in the U.S. following their residency training, and U.S. taxpayers are receiving some return on their training. In addition, fully one-quarter of all 1998 residents who were Medicare active in 2004 were IMGs. Nevertheless, a considerably higher percentage of IMGs than USMGs were not in active practice six years later. There are good reasons why (a) so many IMGs remain active in the U.S. following their training, and (b) why far fewer than 28 percent actually return permanently to their native country.

Table 10-1
USMG and IMG residents in 1998 and their 2004 practice status

	Medicare Physician Registry current practice status		
Type of undergraduate medical school attended	Active	Inactive/no registry record	Total*
U.S.	35,462	6,926	42,388
	83.7% / 74.4%	16.3% / 59.7%	100% / 71.5%
International**	12,177	4,681	16,858
	72.2% / 25.6%	27.8% / 40.3%	100% / 28.5%
Totals	47,639	11,607	59,246
	80.4 %/ 100%	19.6% / 100%	

NOTES: Unduplicated residents counted. Residents from U.S. non-medical schools, international and dental schools also excluded. Excludes pediatrics, psychiatric, other residents in low-Medicare billing specialties, and first/second year surgical residents. The first percentage under each count of residents is the "row" percentage which the second percentage is the "column" percentage.

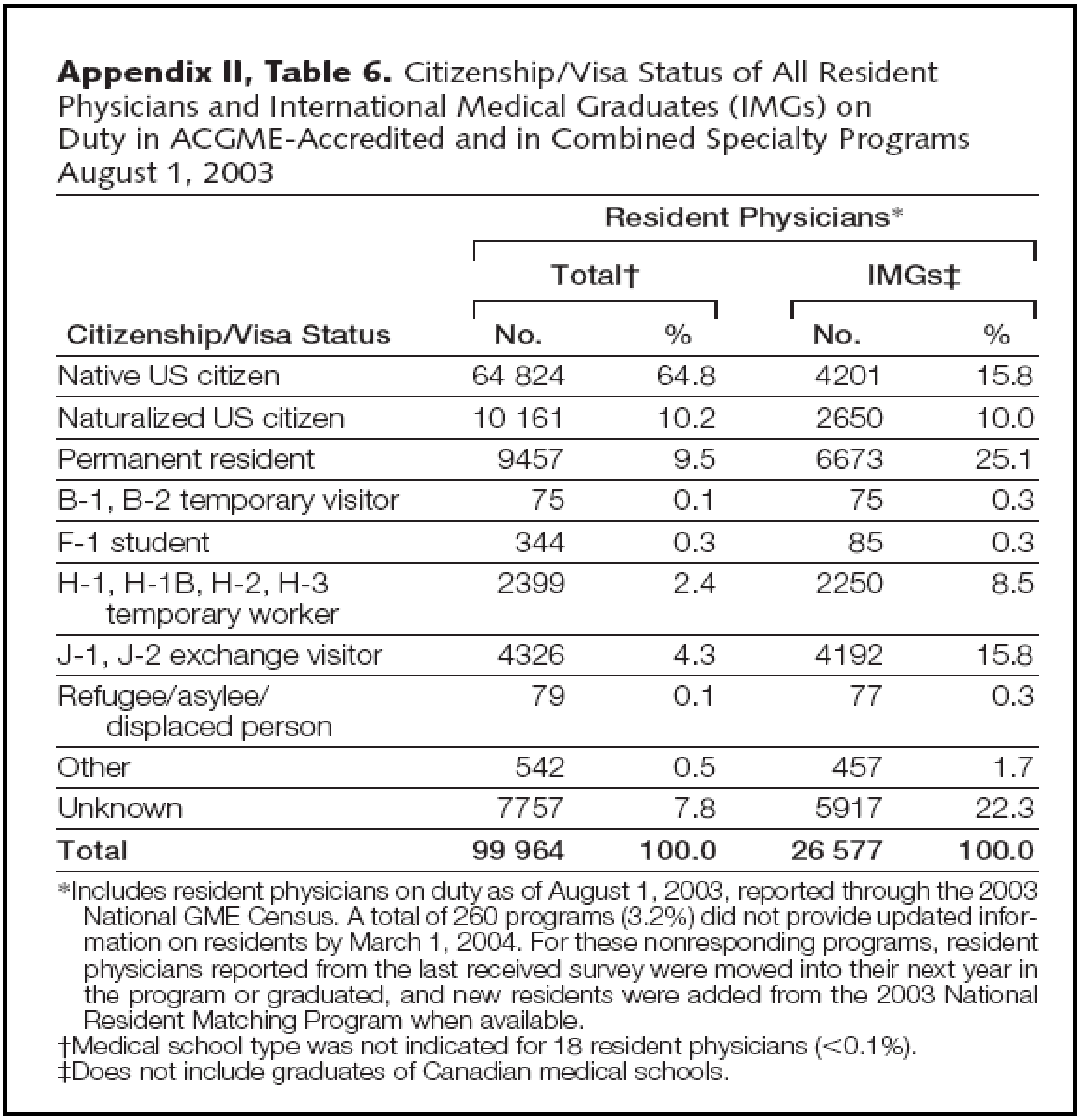
* Excludes a small number of physicians opting out of Medicare or reportedly still a resident.

** Includes 738 Canadian and Puerto Rico medical school graduates.

SOURCE: 1998 *IRIS* file for type of undergraduate medical school attended and March 2004 *Physician Registry* file for current practice status.

Although CMS databases do not capture a resident's citizenship and visa status, such information is collected in the national GME census (Brotherton, Rockey, and Etzel, 2004). Citizen/visa status of calendar year 2003 IMGs is shown in ***Table 10-2***. Nearly 16 percent of IMGs were native U.S. citizens; 10 percent naturalized citizens; and another 25 percent were permanent residents. Hence, roughly one-half of all residents could remain in the U.S. and practice medicine. Another 16 percent of IMG residents had J-status as exchange visitors and are required to return home after residency for at least two years before returning to the U.S. About 9 percent of IMGs with H-status could remain in the U.S. under an employer sponsorship.[56] Thus, of the 24 percent of IMG residents with unmatched UPINs, a significant percentage are in a "return home" phase and do return to the U.S. and enter active practice. Many, too, have returned to the U.S. between 1998 and 2004 and are in active practice.

Table 10-2
Citizenship/visa status of residents



Appendix II, Table 6. Citizenship/Visa Status of All Resident Physicians and International Medical Graduates (IMGs) on Duty in ACGME-Accredited and in Combined Specialty Programs August 1, 2003

	Resident Physicians*			
	Total†		IMGs‡	
Citizenship/Visa Status	**No.**	**%**	**No.**	**%**
Native US citizen	64 824	64.8	4201	15.8
Naturalized US citizen	10 161	10.2	2650	10.0
Permanent resident	9457	9.5	6673	25.1
B-1, B-2 temporary visitor	75	0.1	75	0.3
F-1 student	344	0.3	85	0.3
H-1, H-1B, H-2, H-3 temporary worker	2399	2.4	2250	8.5
J-1, J-2 exchange visitor	4326	4.3	4192	15.8
Refugee/asylee/ displaced person	79	0.1	77	0.3
Other	542	0.5	457	1.7
Unknown	7757	7.8	5917	22.3
Total	**99 964**	**100.0**	**26 577**	**100.0**

*Includes resident physicians on duty as of August 1, 2003, reported through the 2003 National GME Census. A total of 260 programs (3.2%) did not provide updated information on residents by March 1, 2004. For these nonresponding programs, resident physicians reported from the last received survey were moved into their next year in the program or graduated, and new residents were added from the 2003 National Resident Matching Program when available.

†Medical school type was not indicated for 18 resident physicians (<0.1%).

‡Does not include graduates of Canadian medical schools.

SOURCE: Electronically copied from *JAMA* September 1, 2004, Vol. 292, No. 9.

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[56] COGME (1998) recommended that the H-1B visa be eliminated and the J-1 visas require a 5-year return home policy instead of just 2 years.

Visa issues likely explain why a higher percent of IMG residents were inactive or without a UPIN versus USMGs. Of the 12-percentage point difference in inactive/unmatched status, some IMGs do return to the U.S. while others return permanently to their native countries. This leaves the 16 percent of IMG residents who, like USMGs, have no UPIN. It is reasonable to assume that 16 percent of IMG residents are practicing in the U.S. in situations similar to those inactive/unmatched USMGs practicing in:

- Risk-based HMOs
- VA or military hospitals
- Other federal hospitals; or
- Involved full-time in research or administration.

The implication of these adjustments is that a far higher percentage of IMG residents than 72 percent remain in the U.S. in active practice, although not necessarily seeing Medicare patients. The rate likely is much closer to 9-in-10 IMG residents who remain in the U.S., implying a permanent net "leakage" of about 10 percent of IMGs to other countries. The "leakage" rate, however, still raises two important questions:

1. *In what kinds of hospitals do IMG residents do their training?*
2. *In what kinds of service areas do IMG residents locate after completing their training.*

10.5 Location of Teaching Hospitals of 1998 Residents

IMGs are more likely than USMGs to perform their residencies in hospitals that are located in lower income areas. ***Table 10-3*** shows, for each state, the ratio of per capita income of the hospital zip codes where IMGs and USMGs perform their residency. In comparing mean zip code incomes between IMGs and USMGs, we adjusted for cost-of-living differences across areas by calculating income relatives within state rural or metropolitan areas. This was done in three steps. First, zip code income means were weighted by the frequency of IMGs or USMGs to produce mean area incomes for the larger state rural or metro areas. Next, state rural income relatives were based on the ratio of IMG-to-USMG mean income values. Aggregation of relatives into state urban areas was done by, first, constructing income relatives for each metropolitan area in the state, then averaging the metro relatives using resident frequencies in the same areas as weights. For instance, IMGs in Florida perform their residencies in teaching hospitals that are located in zip codes with per capita income only 79 percent of those where USMGs perform residencies. For the U.S. as a whole, IMGs perform their residency in teaching hospitals located in areas with incomes 97 percent of that of USMGs. Twenty-four (of 41 reporting) states have ratios less than 1.0. Of the ten states with the lowest ratios, four are among the seven states with the most residents: New York, California, Illinois, and Massachusetts. Only one state among the seven with the most residents, i.e., Pennsylvania (1.0), does not have a ratio less than 1.0.

Table 10-3
Per capita income of zip codes where IMGs perform residencies relative to USMGs, ranked by state

State	Ratio of IMG to USMG zip code incomes
Florida	0.79
Montana	0.82
Illinois	0.86
New York	0.89
California	0.92
District of Columbia	0.92
New Jersey	0.92
Iowa	0.93
Massachusetts	0.93
Missouri	0.94
Virginia	0.94
Connecticut	0.95
Michigan	0.95
New Hampshire	0.95
Hawaii	0.96
Vermont	0.96
Arkansas	0.97
Maryland	0.97
Kentucky	0.99
Nebraska	0.99
New Mexico	0.99
Oregon	0.99
Rhode Island	0.99
Wisconsin	0.99
Pennsylvania	1.00
Nevada	1.02
North Carolina	1.02
Mississippi	1.03
Georgia	1.05
Kansas	1.05

Continued

Table 10-3 (continued)
Per capita income of zip codes where IMGs perform residencies relative to USMGs, ranked by state

State	Ratio of IMG to USMG zip code incomes
Washington	1.05
Alabama	1.06
West Virginia	1.06
Arizona	1.07
Tennessee	1.07
Utah	1.07
Colorado	1.08
Oklahoma	1.09
Texas	1.09
Wyoming	1.15
Louisiana	1.16
US	0.97

NOTE: See notes to Table 10-1 for list of file exclusions.

SOURCE: 1998 *IRIS* file for type of undergraduate medical school attended and hospital where residency performed.

Run: jimw27, 7/12/05.

10.6 2004 Practice Location of Physicians that were Residents in 1998

Overall, IMGs were about 15 percent ([{15.1% ÷ 13.1%} – 1] × 100) more likely than USMGs to locate in rural than in urban areas (bottom of ***Table 10-4***). Aside from three states that do not have rural areas (District of Columbia, New Jersey, and Rhode Island), IMGs were more likely than USMGs to locate in rural areas in all but eight states. Of the 13 states that have more than 50 percent rural population, ten had IMG/USMG rural odds ratios greater than 1.0. The three rural states with IMG/USMG odds ratios less than 1.0 were South Dakota, Arkansas, and Wyoming.

Table 10-4
Post-residency location in 2004 of 1998 residents by IMG/USMG and urbanicity (in descending order by the odds ratio)

State	Urban Population Share	IMGs Total	IMGs Rural Share	USMGs Total	USMGs Rural Share	IMG to USMG Rural Odds
Delaware	80.0%	53	45.3%	74	14.9%	3.05
Connecticut	95.6	233	3.9	440	1.6	2.43
Louisiana	75.4	129	24.0	558	12.7	1.89
Pennsylvania	84.6	371	13.2	1,287	7.1	1.85
New Mexico	56.9	86	55.8	306	31.0	1.80
Maryland	92.7	280	6.8	812	3.8	1.78
Alabama	69.9	125	26.4	619	15.8	1.67
Tennessee	67.9	205	31.2	860	19.3	1.62
California	96.7	932	3.0	3,532	1.9	1.61
New Hampshire	59.9	46	52.2	250	32.8	1.59
Maine	36.6	57	47.4	167	29.9	1.58
North Dakota	44.2	43	62.8	25	40.0	1.57
Montana	33.9	9	88.9	123	57.7	1.54
Illinois	84.9	625	12.5	1,729	8.2	1.52
Utah	76.5	53	26.4	303	17.5	1.51
Washington	83.1	140	18.6	633	12.5	1.49
North Carolina	67.5	235	28.9	1,387	19.8	1.46
South Carolina	70.0	125	35.2	350	24.3	1.45
Kentucky	48.8	289	48.8	539	35.8	1.36
Virginia	78.1	192	24.0	823	17.6	1.36
Ohio	81.2	237	19.0	480	14.2	1.34
Michigan	82.2	213	23.9	463	18.8	1.27
Wisconsin	67.9	308	28.6	823	22.5	1.27
Iowa	45.3	126	47.6	260	38.8	1.23
West Virginia	42.3	105	62.9	245	51.4	1.22
Georgia	69.2	310	28.7	1,148	23.9	1.20
Oklahoma	60.8	95	32.6	515	27.2	1.20
Idaho	39.3	11	54.5	130	46.2	1.18
Indiana	72.2	211	19.0	333	16.5	1.15
Florida	92.8	623	4.2	1,206	3.6	1.14

Continued

Table 10-4 (continued)
Post-residency location in 2004 of 1998 residents by IMG/USMG and urbanicity (in descending order by the odds ratio)

State	Urban Population Share	IMGs Total	IMGs Rural Share	USMGs Total	USMGs Rural Share	IMG to USMG Rural Odds
Oregon	73.1	58	25.9	432	22.7	1.14
Kansas	56.6	75	42.7	383	37.6	1.13
Mississippi	36.0	75	53.3	349	47.6	1.12
Texas	84.8	837	9.0	3,213	8.0	1.12
Minnesota	70.4	119	24.4	291	22.7	1.07
Hawaii	72.3	21	19.0	145	17.9	1.06
Alaska	41.5	9	44.4	74	41.9	1.06
Colorado	83.9	89	13.5	876	12.8	1.05
Vermont	27.8	11	54.5	128	52.3	1.04
Missouri	67.8	275	21.5	812	21.2	1.01
Arizona	88.2	208	11.1	645	11.2	0.99
South Dakota	34.6	29	58.6	53	60.4	0.97
Nebraska	52.6	48	39.6	222	41.0	0.97
Arkansas	49.4	96	30.2	273	33.0	0.92
Wyoming	30.0	6	66.7	60	73.3	0.91
New York	92.1	1,782	4.5	3,321	5.2	0.87
Nevada	87.5	109	8.3	256	12.9	0.64
Massachusetts	96.1	514	0.2	1,887	0.5	0.41
District of Columbia	100.0	38	0.0	130	0.0	n/a
New Jersey	100.0	680	0.0	1,283	0.0	n/a
Rhode Island	94.1	104	0.0	194	0.0	n/a
Totals	80.3%	11,650	15.1%	35,447	13.1%	1.15

NOTES: See notes to Table 10-1 for list of file exclusions.

SOURCE: 1998 *IRIS* file for type of undergraduate medical school attended and *March 2004 Physician Registry* file for current practice status. *Statistical Abstract* No. 25, 2003 for share of state population that is urban.

Run: jimw24, 6/15/05.

IMGs are also more likely than USMGs to locate in areas with lower incomes. The final two columns in ***Table 10-5*** show, for each state, the ratio of per capita income in rural and urban zip code areas where IMGs and USMGs locate. For instance, IMGs in rural Alabama are located in zip codes that have per capita incomes that are 92 percent of those in which USMGs are located. The difference in relative zip code incomes in Alabama's urban areas is even greater, i.e., 85 percent. For the U.S. as a whole, IMGs locate in zip codes with incomes 93 percent of that of USMGs (not shown in Table 10-5). IMGs locate in rural zip codes with incomes 96 percent of that of USMGs compared with 93 percent in all urban areas (Table 10-5). In about three-fourths of the 99 state rural/urban areas, IMGs locate in lower income zip codes than USMGs. For rural areas, the lowest income ratio is 87 percent in South Carolina while for urban areas it is 80 percent in New York.[57]

10.7 Post-residency Location of New York City Residents

In addition to the general issues of whether IMGs stay in the U.S. and where they locate after completion of GME, the concentration of IMGs in the New York City (NYC) was also a source of Congressional concern. Of the IMGs in residency in NYC in 1998 and remained in the U.S., 31 percent were practicing in NYC as of 2004 (***Table 10-6***). Another 6 percent were practicing elsewhere in New York State (37.5 - 31.3 percent) while another 9 percent remained in other mid-Atlantic states (Pennsylvania or New Jersey). South Atlantic states "recruited" 14.5 percent of NYC residents and East North Central states nearly 8 percent. West North Central and East South Central states recruited the fewest NYC residents (***Figure 10-1***).

10.8 Practice Specialty

Forty-four percent of all 1998 residents had a primary care specialty in 2004, while 16 percent had a medical specialty, 15 percent had a surgical specialty, and 25 percent had a support specialty such as radiology (***Table 10-7***).[58] Forty-five percent of IMGs locating in urban areas following GME have a primary care specialty while nearly 60 percent of rural IMGs have a primary care specialty. IMGs are more likely than USMGs to have a primary care specialty in both urban and rural areas. IMGs are also more much likely than USMGs to have a medical subspecialty in both urban and rural areas. On the other hand, USMGs are four times as likely as IMGs to be surgeons. USMGs are also more likely than IMGs to have a support specialty. With only a minor exception or two, these national patterns are found within each of the four census regions.

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[57] We found that over 50 percent of both IMGs and USMGs located in HPSAs, a result that lacks face validity.

[58] Based on CMS (HCFA) Provider Specialties: The support category includes anesthesiology and its critical subspecialty, emergency medicine, nuclear medicine, pathology and its sub-specialties, physical medicine and rehabilitation, and radiology and related subspecialties.

Table 10-5
Per capita income of areas where IMGs locate relative to where USMGs locate

State	Urban Population Share	Ratio of IMG to USMG zip code incomes	
		Rural	Urban
Alabama	69.9%	0.92	0.85
Alaska	41.5	1.01	1.02
Arizona	88.2	1.21	1.00
Arkansas	49.4	0.96	1.01
California	96.7	0.95	0.93
Colorado	83.9	0.93	0.95
Connecticut	95.6	1.01	0.94
Delaware	80.0	0.96	1.08
District of Columbia	100.0	n/a	0.92
Florida	92.8	0.94	0.97
Georgia	69.2	0.90	0.93
Hawaii	72.3	1.07	1.05
Idaho	39.3	1.01	0.99
Illinois	84.9	1.00	0.81
Indiana	72.2	0.97	0.93
Iowa	45.3	0.99	0.98
Kansas	56.6	0.93	0.86
Kentucky	48.8	0.92	0.89
Louisiana	75.4	0.95	0.91
Maine	36.6	0.88	0.99
Maryland	92.7	0.99	1.01
Massachusetts	96.1	0.90	0.95
Michigan	82.2	0.93	0.92
Minnesota	70.4	0.96	0.98
Mississippi	36.0	0.92	1.14
Missouri	67.8	0.98	0.99
Montana	33.9	1.00	0.99
Nebraska	52.6	0.97	0.99
Nevada	87.5	0.95	0.97
New Hampshire	59.9	0.95	0.94
New Jersey	100.0	n/a	0.94
New Mexico	56.9	1.19	1.02
New York	92.1	0.93	0.80

Continued

Table 10-5 (continued)
Per capita income of areas where IMGs locate relative to where USMGs locate

		Ratio of IMG to USMG zip code incomes	
State	Urban Population Share	Rural	Urban
North Carolina	67.5	0.92	0.98
North Dakota	44.2	0.96	0.96
Ohio	81.2	0.97	0.94
Oklahoma	60.8	0.90	0.99
Oregon	73.1	0.98	1.01
Pennsylvania	84.6	1.00	1.01
Rhode Island	94.1	n/a	0.99
South Carolina	70.0	0.87	0.99
South Dakota	34.6	1.06	1.09
Tennessee	67.9	0.92	0.92
Texas	84.8	0.98	0.96
Utah	76.5	0.91	1.00
Vermont	27.8	1.05	0.95
Virginia	78.1	0.92	0.94
Washington	83.1	1.00	1.00
West Virginia	42.3	0.98	0.99
Wisconsin	67.9	1.00	0.94
Wyoming	30.0	1.21	1.02
U.S.	80.3	0.96	0.93

NOTE: See notes to Table 10-1 for list of file exclusions.

SOURCE: 1998 *IRIS* file for type of undergraduate medical school attended and *March 2004 Physician Registry* file for current practice status. *Statistical Abstract* No. 25, 2003 for share of state population that is urban.

Run: stat006, 6/29/05.

Table 10-6
Location of 1998 New York City IMGs Following Graduation, 2004

Census Division	Count	Percent
New England	140	4.73%
Middle Atlantic	1,382	46.70
New York State	1,108	37.45
New York City	927	31.33
East North Central	234	7.91
West North Central	107	3.62
South Atlantic	430	14.53
East South Central	122	4.12
West South Central	200	6.76
Mountain	139	4.70
Pacific	205	6.93
Totals	2,959	100.00

NOTE: See notes to Table 10-1 for list of file exclusions.

SOURCE: 1998 *IRIS* file for type of undergraduate medical school attended and *March 2004 Physician Registry* file for current practice status.

Run: wrun81, 8/2/04.

Table 10-7
Distribution of 1998 Residents by 2004 Specialty and Location

	2004 Practice Location				
		IMGs		USMGs	
	Total Physicians	Urban	Rural	Urban	Rural
Primary Care	44%	45%	59%	41%	53%
Medical Specialty	16	26	20	14	7
Surgical Specialty	15	5	4	19	16
Support	25	23	17	26	24
Totals	100	100	100	100	100

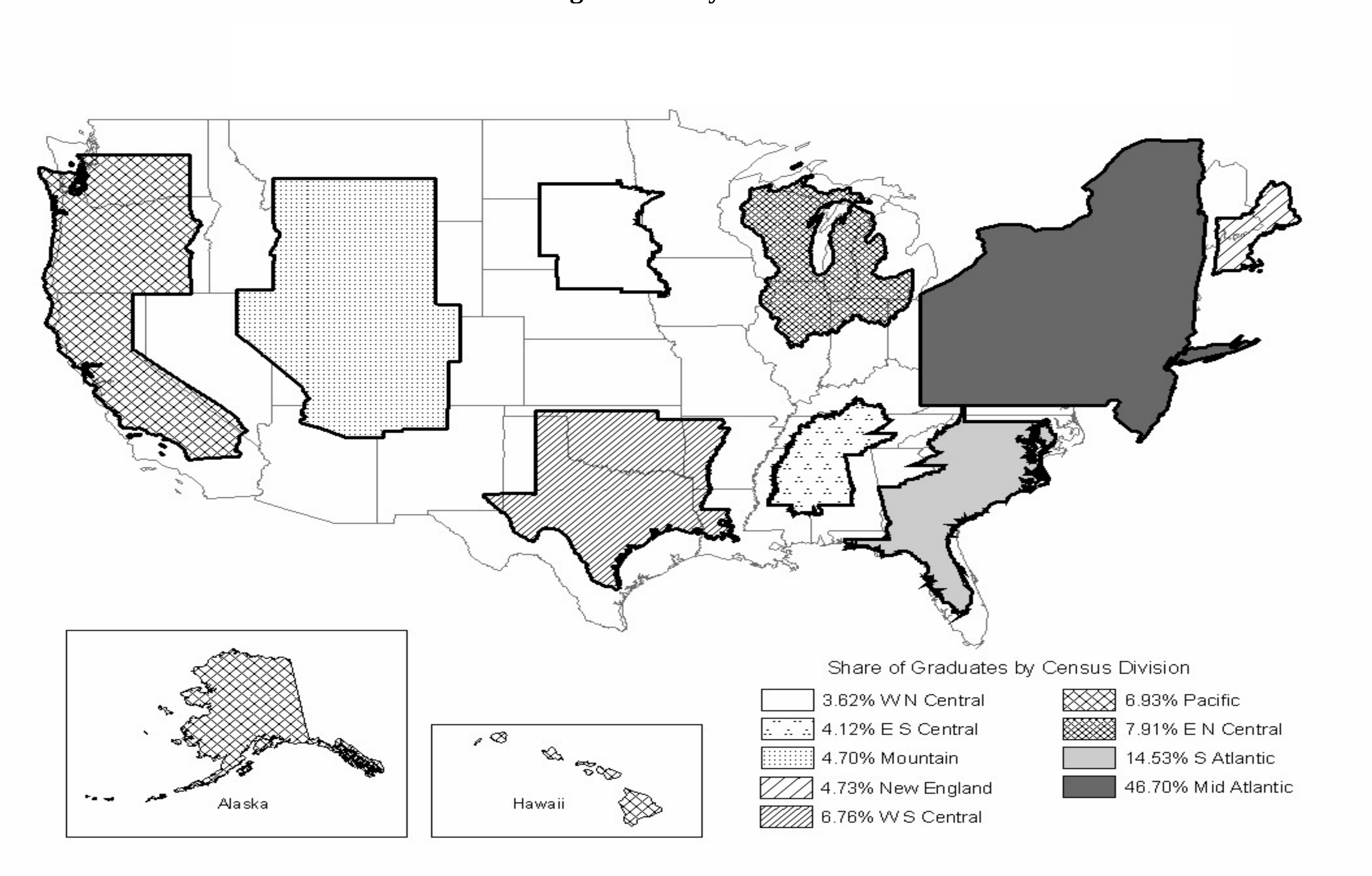
NOTE: See notes to Table 10-1 for list of file exclusions.

SOURCE: 1998 *IRIS* file for type of undergraduate medical school attended and *March 2004 Physician Registry* file for current practice status.

* Based on CMS (HCFA) Provider Specialties: The *support* category includes anesthesiology and its critical subspecialty, emergency medicine, nuclear medicine, pathology and its sub specialties, physical medicine and rehabilitation, and radiology and related subspecialties.

Run: jimw25, 6/28/05.

Figure 10-1
Location of 1998 New York City IMGs following graduation, 2004
share of graduates by census division



10.9 Key Findings

Key findings regarding IMG locational patterns and specialization post-residency are summarized in ***Exhibit 10-1***.

Exhibit 10-1
Key findings: IMG Location and Specialization

Issue	Finding
IMG Retention Rates	1. At least 72 percent of IMGs remain in the U.S. following completion of their residency and are actively providing medical care to Medicare beneficiaries on a fee-for-service (FFS) basis. 2. Some IMGs, perhaps as many as 16 percent, remain in the U.S. but are: a. Not billing Medicare on a FFS basis because of their specialty or because they work in HMOs with M+C (Medicare Advantage) risk contracts; b. Providing medical care in VA and military hospitals and federal hospitals; or c. In research or administrative positions. 3. Approximately 9-in-10 IMGs remain in the U.S. and involved in medical care in some capacity. 4. Most of the rest of the IMGs without a *Physician Registry* record probably have J-1 or H-1B visas and have returned to their home country. Those with a J-1 visa are eligible to return to the U.S. after two years.
IMG Residency Location vis-à-vis USMGs	5. IMGs are more likely than USMGs to perform their residencies in hospitals that are located in lower income areas.
IMG Practice Location vis-à-vis USMGs	6. IMGs disproportionately locate in the rural areas of 40 states. 7. IMGs are more likely than USMGs to locate in poorer urban and rural areas. 8. About 31 percent IMGs performing their residency in New York City stay in the U.S. and practice in New York City.
IMG Practice Specialty	9. IMGs, compared to USMGs, disproportionately specialize in primary care. 10. 45 percent of IMGs practicing in urban areas have primary care specialties. 11. 60 percent of IMGs practicing in rural areas have primary care specialties. 12. USMGs are 4 times more likely than IMGs to have a surgical specialty. 13. For the past two decades, COGME, policymakers, and others have called for a greater emphasis on primary care than on surgery and sub-specialization. Our findings suggest that IMGs are more likely than USMGs to fulfill national primary care goals. Loss of IMGs would further exacerbate the perceived imbalance between primary care and sub-specialization.

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APPENDIXES

APPENDIX 3-A

DERIVATION OF RESIDENT NEGATIVE WAGE FACING TEACHING HOSPITALS

APPENDIX 3.A
DERIVATION OF RESIDENT NEGATIVE WAGE FACING TEACHING HOSPITALS

This appendix derives the first-order maximizing conditions for resident demand in teaching hospitals. Assume the non-profit teaching hospital maximizes a utility function with discharges (Q), an indicator of community service, and number of residents [R] as arguments subject to a breakeven and a production function constraint:

MAX: U[Q, R] = the hospital's utility function with discharges and total residents as arguments or goals.

Breakeven Constraint: Total Revenues (RV) >= Costs (C)

Hospital revenues can be decomposed into Medicare and non-Medicare revenues:

$RV = W_r(1+ s)PDS \bullet R + FR(IME)Q_m + p_v(Q_v)Q_v$

W_r = average annual wages of residents
s = the adjustment factor allowed by Medicare to cover additional faculty costs of supervising and teaching residents
PDS = Medicare's share of inpatient days.
FR = the hospital's federal Medicare rate adjusted for local wages and average DRG case mix costliness
IME = the hospital's indirect medical education add-on factor = $1.89[1+R/B]^{.405}$ in 1996
Q_m = the number of Medicare discharges
$p_v(Q_v)$ = the price of paid by private patients, as an inverse function of discharges provided
Q_v = number of private payer discharges.

The $W_r(1+ s)PDS \bullet R$ revenue term reflects the financial reimbursement made by Medicare to cover Direct Medical Education. Indirect Medical Education is reflected by the $FR(IME)Q_m$ term. Both supplements add to hospital revenues as a direct consequence of employing residents. Faculty training costs add to the basic salary costs of residents.

The hospital's cost equation is the sum of resident, nurse, and physician inputs times their respective hourly wage:

$C = W_rR + W_nN + W_{md}MD + W_{md}R + rB$

W_n , W_{md} = average annual wages of residents, nurses, and physicians, respectively
R, N, MD = the number of FTE residents, nurses, and salaried physicians paid by the hospital for direct patient care
rB = the cost of fixed inputs such as beds.

To serve more patients, hospitals must employ labor and non-labor inputs but the mix can vary depending upon labor scarcity and case mix:

Production Function: $Q = f[R, N, MD, B]$

Forming the Lagrangian function, L, and deriving first-order conditions for optimal output and residents:

$$(1)\quad L = U[Q, R] + \lambda_1[FR(IME)Q_m + p_v(Q_v)Q_v + W_r(1+ s)PDS\bullet R - W_rR - W_nN - W_{md}MD] + \lambda_2[f[R, N, MD, B] - Q]$$

$$(2a)\quad \partial L/\partial Q = U'_q + \lambda_1[\alpha p^*_m + (1-\alpha)\, p^*_v\,] - \lambda_2 = 0$$

α = the share of Medicare in all discharges;
$p^*_m = FR(IME)$;
$p^*_v = \{p_v + Q_vp'_{vq}\}$ and p'_{vq} = the change in private price for a unit increase in output.

The p^*_m and p^*_v variables stand for the marginal transaction prices, or payments, for Medicare and privately insured discharges, respectively. The first order conditions for the three inputs and the two constraints are:

$$(2b)\quad \partial L/\partial R = U'_r + \lambda_1[FR\bullet Q_m(\partial IME/\partial R) + W_r(1+ s)PDS - W_r] + \lambda_2 f'_r = 0$$

$$(2c)\quad \partial L/\partial N = + \lambda_1[-W_n\,] + \lambda_2 f'_n = 0$$

$$(2d)\quad \partial L/\partial MD = + \lambda_1[-W_{md}] + \lambda_2 f'_{md} = 0$$

$$(2e)\quad \partial L/\partial \lambda_1 = p^*_mQ_m + p_v(Q_v)Q_v + W_r(1+ s)PDS\bullet R - W_rR - W_nN - W_{md}MD = 0$$

$$(2f)\quad \partial L/\partial \lambda_2 = f[R, N, MD, B] - Q = 0.$$

U'_r, U'_q = the marginal utility of residents and volumes, respectively
f'_r, f'_n, f'_{md} = the marginal products of residents, nurses, and physician attendings, respectively.

Of particular interest is the first-order condition for residents that leads to the demand for residents. Solving eq. (2a) for λ_2 and inserting into (2b) gives

$$(2b')\quad \partial L/\partial R = U'_r + \lambda_1[FR\bullet Q_m(\partial IME/\partial R) + W_r(1+ s)PDS - W_r\,] + f'_r\,[U'_q + \lambda_1[\alpha p^*_m + (1-\alpha)p_v]] = 0$$

Rearranging (2b') and solving for the marginal product of residents as a function of their real effective wage, i.e.,

$$(3)\quad f'_r = \frac{W_r[1 - (1+ s)PDS] - FR\bullet Q_m(\partial IME/\partial R) - U'_r/\lambda_1}{[U'_q + [\alpha p^*_m + (1-\alpha)p_v]]}$$

The optimal level of residents is achieved where the resident marginal product is set equal to the resident's effective real wage. The real wage depends on resident salaries in the numerator, debited for the DME subsidy, (1+ s)PDS. The DME-adjusted wage is further reduced by the positive effect more residents have on Medicare via IME payments. It is even further reduced by the direct utility hospitals gain from having larger resident programs, adjusted downwards by the marginal cost, or debit, that residents have on the breakeven constraint, λ_1. The resident's completely adjusted wage in the numerator is expressed in relation to the hospital's average price per discharge in the denominator, increased by the marginal utility of generating more discharges.

It is useful to express the IME adjustment, like the DME adjustment, as a percentage of the resident's nominal wage. First, $(\partial IME/\partial R) = .765(1+IRB)^{-.595}/B$, where IRB = the hospital's intern and resident per bed ratio (.765 = 1.89x.405). Dividing the IME effect through by the nominal resident wage and reformulating Q_m/B as $(PDS/ALOS_m)(365*OCCR)$, where $ALOS_m$ = the Medicare average length of stay and OCCR = the hospital's overall occupancy rate, the numerator of (3) now becomes

$$(4)\quad f'_r = \frac{W_r\left[1 - (1+s)PDS] - (FR/W_r)(PDS/ALOS_m)(365*OCCR)(.765(1+IRB)^{-.595})\right] - U'_r/\lambda_1}{[U'_q + [\alpha p^*_m + (1-\alpha)p_v]]}$$

The term in brackets is a (negative) adjustment to the resident's nominal wage due to two marginal subsidies, one for DME, and another for IME. The IME subsidy is influenced by at least five factors: (1) the ratio of the hospital's federal DRG rate to the resident's annual wage, (2) the patient day share of Medicare inpatient days, (3) the Medicare length of stay, (4) the hospital's occupancy rate, and (5) the hospital's IRB, or teaching intensity. The IME wage subsidy is greater the greater is the federal rate to the wage, i.e., the resident generates a greater Medicare payment. This effect is enhanced if Medicare pays for a larger percentage of inpatient days and the occupancy rate is higher. Longer Medicare stays reduce the subsidy be reducing Medicare discharges, ceteris paribus. The marginal IRB effect reduces, not increases, the subsidy, because of the non-linear exponential relationship. High IRB teaching hospitals gain a lower proportional effect of any increase in residents.

Higher Medicare and/or private prices in the denominator further reduce the nominal wage because they enhance the volume impact generated through more residents. Higher marginal values placed on either volumes or residents further add to the real value of residents.

APPENDIX 9

APPENDIX 9.A
MEDICARE COST REPORT WORKSHEETS

APPENDIX 9.A
MEDICARE COST REPORT WORKSHEETS

Intern and Resident Counts

Four MCR worksheets contain counts of interns and residents: (1) S-3, Part I, (2) E, Part A, (3) L, and (4) E-3, Part IV. Worksheet E, Part A is used to calculate IME payments for the operating portion of PPS payments while L is used to calculate IME payments for the capital portion of PPS payments. Worksheet E-3, Part IV is used to calculate direct medical education payments.

Prior to the BBA, full-time equivalent (FTE) counts of interns and residents used on Worksheets L and E, Part A were taken directly from the counts entered on S-3, Part I. Only a grand total count of FTE interns and resident is on S-3, Part I. That is, it includes all residents, not just medical (allopathic and osteopathic) but dental and podiatric as well. Worksheet E-3, Part IV, does distinguish between primary care residents and all other. Because the method of counting residents for direct medical education payments differs from that used for IME payments, the total number of residents reported on E-3, Part IV can differ from those reported on S-3, Part I.

Worksheet E, Part A

Subsequent to the BBA's passage, Worksheet E, Part A was expanded from 6 to 24 lines, some of which are no longer being used (see Exhibit 9.A-1 for a facsimile of the IME portion of the worksheet). New lines were added to accommodate multiple multiplier factors during the reporting year, the caps on medical residents, allowed residents, the rolling average of residents, and the cap on the intern and resident to bed ratio (IRB). To help understand the components of Worksheet E, Part A, we use the following simplified formulas for determining IME operating payments (IME_pay) and the IME adjustment factor (IME_adj):

$$\text{IME\_pay} = (3 \text{ Federal portions}) \text{ H IME\_adj}. \qquad (1)$$

$$\text{IME\_adj} = ((\, 1 + \text{IRB}\,)^{0.405} - 1) \text{ H MF} \qquad (2)$$

where MF is the multiplier factor. The IRB used in IME_adj is lesser of the current period's IRB and the prior period's IRB. The current period's IRB is equal to Line 17 on the worksheet divided by Line 3 on the worksheet (average number of available beds during the current year). Because of the importance of Line 17, a detailed discussion is presented on resident caps, actual resident counts, allowed residents, the rolling average, and residents in new residency programs. The current and prior year's IRBs are discussed next. This is then followed by a discussion of the Federal portions.

Exhibit 9.A-1
Worksheet E, Part A

05-04 CMS FORM-2552-96 3690 (Con't)

CALCULATION OF REIMBURSEMENT SETTLEMENT	PROVIDER NO.: ____________ COMPONENT NO. ______________	PERIOD: FROM ___________ TO ________________	WORKSHEET E, PART A

Check Applicable Box	[ ] Hospital [ ] Subprovider

PART A - INPATIENT HOSPITAL SERVICES UNDER PPS

	DRG Amount		
1	Other Than Outlier Payments occurring prior to October 1		1
1.01	Other than Outlier Payments occurring on or after October 1 and before January 1.		1.01
1.02	Other than Outlier Payments occurring on or after January 1		1.02
	Managed Care Patients		
1.03	Payments prior to March 1st or October 1st.		1.03
1.04	Payments on or after October 1 and prior to January 1.		1.04
1.05	Payments on or after January 1st but before April 1st/October 1st.		1.05
1.06	Additional amount received or to be received (see instructions)		1.06
1.07	Payments for discharges on or after April 1, 2001 through September 30, 2001.		1.07
1.08	Other Than Outlier Payments occurring prior to October 1		1.08
2	Simulated payments from the PS&R on or after April 1, 2001 through September 30, 2001.		2
2.01	Outlier payments for discharges occurring prior to October 1, 1997 (see instructions)		2.01
2.02	Outlier payments for discharges occurring on or after October 1, 1997 (see instructions)		2.02
3	Bed days available divided by number of days in the cost reporting period (see instructions)		3
	Indirect Medical Education Adjustment		
3.01	Number of Interns & Residents from Worksheet S-3, Part I	▨	3.01
3.02	Indirect medical education percentage (see instructions)	▨	3.02
3.03	Indirect medical education adjustment (sum of lines 1, 1.01, 1.02, and 2 times line 3.02)	▨	3.03
3.04	FTE count for allopathic and osteopathic programs for the most recent cost reporting period ending on or before 12/31/1996 (see instructions).		3.04
3.05	FTE count for allopathic and osteopathic programs which meet the criteria for an add-on to the cap for new programs in accordance with section 1886(d)(5)(B)(viii)		3.05
3.06	Adjusted FTE count for allopathic and osteopathic programs for affiliated programs in accordance with Section 1886(d)(5)(B)(viii)		3.06
3.07	Sum of lines 3.04 through 3.06		3.07
3.08	FTE count for allopathic and osteopathic programs in the current year from your records		3.08
3.09	For cost reporting periods beginning before October 1, enter the percentage of discharges occurring prior to October 1.	▨	3.09
3.10	For cost reporting periods beginning before October 1, enter the percentage of discharges occurring on or after October 1.	▨	3.10
3.11	FTE count for the period identified in line 3.09	▨	3.11
3.12	FTE count for the period identified in line 3.10	▨	3.12
3.13	FTE count for residents in dental and podiatric programs.		3.13
3.14	Current year allowable FTE (see instructions)		3.14
3.15	Total allowable FTE count for the prior year, if none but prior year teaching was in effect enter 1 here. ………………		3.15
3.16	Total allowable FTE count for the penultimate year if that year ended on or after September 30, 1997, otherwise enter zero. If there was no FTE count in this period but prior year teaching was in effect enter 1 here ………………………		3.16
3.17	Sum of lines 3.14 through 3.16 divided by the number of those lines in excess of zero (see instructions).		3.17
3.18	Current year resident to bed ratio (line 3.17 divided by line 3).		3.18
3.19	Prior year resident to bed ratio (see instructions)		3.19
3.20	For cost reporting periods beginning on or after October 1, 1997, enter the lesser of lines 3.18 or 3.19. (see instructions)		3.20
3.21	IME payments for discharges occurring prior to October 1 (see instructions)		3.21
3.22	IME payments for discharges occurring on or after October 1 but before January 1 (see instructions)		3.22
3.23	IME payments for discharges occurring on or after January 1 (see instructions)		3.23
3.24	Sum of lines 3.21 through 3.23.		3.24

Notes:
1. Lines 3.25 and higher not shown
2. Reporting cells not used after 1997 are cross-hatched.

Resident Caps. The “cap section” of the worksheet consists of four lines. Line 3.04 is the “basic 1996 cap” and is the number of FTE medical residents on last MCR dated December 30, 1996 or earlier. Line 3.05 is the number of FTE residents in a new program. Line 3.06 is the adjusted FTE count of medical residents in affiliated programs. Line 3.07 is the “adjusted FTE cap” and is the sum of lines 3.04 through 3.06.

While the basic 1996 cap might seem to be a fixed, unchangeable number, it is not. Hospitals have been allowed to obtain upward adjustments to it to account for residents on leave (e.g., pregnancy). In addition, when, as allowed by BIPA, qualifying rural hospitals expand their existing programs, the new residents are counted in Line 3.04 rather than 3.05. Note that this cap applies only to medical residents. There is no cap for dental and podiatric residents.

Counts of residents in new programs are not put in Line 3.05 until after the new program has passed its initial phase (see the discussion of new residency programs below). Once a new program has become established, its resident cap count is put into Line 3.05 and remains there until the program is terminated. That is, the resident counts in new programs are *not* moved to Line 3.04.

The affiliation cap is used to allow for residents that are rotating in or out of a hospital as part of an affiliation agreement. For individual hospitals, this value may be negative (rotating out) or positive (rotating in).

Actual Residents. The actual number of FTE medical residents for the current year is entered on Line 3.08 while the actual number of FTE dental and podiatric residents for the current year is entered on Line 3.13. (Use of Lines 3.09 through 3.12 was discontinued for cost reports beginning after October 1, 1997.)

Allowed Residents. Line 3.14 contains the number of allowed FTE residents for the current reporting year. It is equal to the number of FTE dental and podiatric residents plus the lesser of the actual number of FTE medical residents (Line 3.08) and the adjusted cap (Line 3.07). It is in Line 3.14 where the current year’s FTE cap is applied to medical residents.

Rolling Average. Line 3.17 is equal to the rolling average of residents plus add-ons for new residents (see discussion below on new residency programs) and residents that moved over to the hospital from hospital closure or a hospital that discontinued its residency program. The rolling average is the sum of Lines 3.14, 3.15 (prior year’s Line 3.14), and 3.16 (penultimate year’s Line 3.14) divided by the number of lines (up to three) with entries greater than zero. The “add-ons” are then added to the rolling average.

New Residency Programs. In order to not penalize new residency programs in their initial phases, the number of actual residents in such programs is not subject to the FTE resident cap or the rolling average. Consequently, hospitals are instructed to add residents in these programs to the rolling average with the result located in Line 3.17. Once the initial phase of a new residency program has passed (typically two to three years), a cap number is established and it goes into Line 3.05. Additionally, the number of actual FTE residents goes into Line 3.08 along with the rest of the actual count of FTE residents.

Miscellaneous. In those relatively rare occasions when a teaching hospital closes or it just terminates its residency programs, the residents that have not finished their GME can complete their GME at another hospital. The hospitals where such residents complete their training, “recipient” hospitals, are not penalized. That is, the number of such residents is added to the rolling average of the recipient hospital and the result is also located in Line 3.17.

Current Year IRB. The current year IRB (Line 3.18) is equal to Line 3.17 divided by Line 3.

Prior Year IRB. From the prior year’s cost report, the prior year IRB (Line 3.19) is generally equal to Line 3.14 divided by Line 3. (Recall that Line 3.14 contains the count of the allowed residents for the year.) However, this calculation is modified for the following two circumstances (Instructions for the HOSPITAL AND HOSPITAL HEALTH CARE COMPLEX COST REPORT FORM CMS-2552-96, Section 3630.1, July 2004):

- “If the allopathic and osteopathic FTE residents were subject to the FTE cap in the prior year, add to the numerator the FTE residents in the initial years of the program ... from line 3.17 of that year.”
- “Also, add to the numerator (i.e., prior years FTEs) the number of additional FTE residents in the current year due to an affiliation agreement ...”

These adjustments to the prior year’s IRB protect hospitals that have new residency programs and affiliations from being penalized through the IRB cap. Other adjustments, not shown, pertain to cost reporting periods beginning in 2002 and after.

Settlement IRB. The IRB used to calculate the IME adjustment factor and IME operating payments (Line 3.20) for the current year is the lesser of the current year IRB (Line 3.18) and the prior year IRB (Line 3.19).

Federal Portions. The Federal portion (FP) of the operating part of the payment for a PPS discharge is equal the DRG weight (DRGW) for the discharge multiplied by the sum of the standardized labor amount (SLA) multiplied by the PPS area wage index (WI) plus the standardized nonlabor amount (SNLA) multiplied by the nonlabor price index (NLPI[59]):

$$FP = DRGW\ H\ ([SLA\ H\ WI] + [SNLA\ H\ NLPI]). \tag{3}$$

There are two types of Federal portions used in the worksheet, the standard PPS Federal portions and those associated with discharges for Medicare beneficiaries enrolled in Medicare+Choice programs (M+C, now Medicare Advantage). In both cases, the sum of the Federal portions for all discharges is entered in the worksheet.

The sums of the standard PPS Federal portions are located on Lines 1, 1.01, 1.02, 1.06, and 1.07. The reason for this is to allow for multiple IME multiplier factors that may have been

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[59] The nonlabor price index is equal to one for hospitals located in the “lower 48” United States.

effect during a hospital's fiscal year. That is, the Federal portions are summed according to the discharge dates on the claims.

Similarly, the sums of the Federal portion associated with M+C discharges are reported on lines 1.03, 1.04, 1.05, and 1.08. Incorporated in the reporting for these lines are transition shares (20 percent for 1998, increasing by 20 percentage points annually thereafter through 2002).

APPENDIX 9.B
RESIDENT TABLES

Table 9.B-1
Number of hospitals, residents, and beds by size of residency program in 1996, for 1996 and 2001

Number of Residents at the Hospital		1996			2001*		
Greater than and	Less than or equal to	Hospitals	Residents	Beds	Hospitals	Residents	Beds
	0	3,716	0	400,685	3,417	0	326,640
0	10	408	1,454	82,813	398	1,502	74,769
10	20	151	2,254	35,757	158	2,381	34,997
20	50	207	6,558	59,272	209	6,524	57,690
50	100	122	8,658	43,325	128	8,929	42,203
100	200	110	15,355	51,000	109	15,300	47,797
200	300	59	14,531	29,214	56	13,851	24,413
300	400	22	7,442	11,471	29	9,906	16,740
400	500	18	7,953	13,190	19	8,455	11,320
500	1000	15	8,628	12,980	19	11,547	15,045
1000		0	0	0	1	1,133	1,692
Totals							
All		4,828	72,833	739,707	4,543	79,527	653,306
With residency programs		1,112	72,833	339,022	1,126	79,527	326,666
Percent with residency program		23%			25%		

SOURCE: Medicare Cost Reports, 1996 and 2001. All teaching hospitals except HHC and other selected hospitals with missing MCRs for some years.

Run: jimw06, 4/5/05

Table 9.B-2
Number of teaching hospitals with changes in residents by magnitude and direction of change, 1996-2001

Absolute Value of change	Increased	Decreased	Total
0 - 1 %	20	19	39
1 - 3 %	48	31	79
3 - 5 %	36	22	58
5 - 10 %	93	65	158
10 - 20 %	127	60	187
20 - 30 %	79	30	109
> 30 %	225	146	371
Totals	628	373	1,001

NOTES: There was no change in the number of residents in 17 teaching hospitals.

SOURCE: Medicare Cost Reports, 1996 and 2001. All teaching hospitals except HHC and other selected hospitals with missing MCRs for some years.

Run: jimw07a, 4/5/2005

Table 9.B-3
Number of hospitals with changes in residents by hospital location and by the magnitude and direction of changes in the number of residents, 1996-2001

Absolute Value of Resident Change	Hospital Location					
			Urban			
	Rural		Large Area		Other Area	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
0 - 1 %	0	0	14	13	6	6
1 - 3 %	3	0	34	20	11	11
3 - 5 %	1	0	25	16	10	6
5 - 10 %	1	5	58	41	34	19
10 - 20 %	5	4	70	31	52	25
20 - 30 %	5	3	38	16	36	11
> 30 %	27	27	109	73	89	45
Totals	42	39	348	210	238	123

NOTE: There was no change in the number of residents in 17 teaching hospitals.

SOURCE: Medicare Cost Reports, 1996 and 2001. All teaching hospitals except HHC and other selected hospitals with missing MCRs for some years.

Run: jimw07a, 4/5/2005

Table 9.B-4

New teaching hospital after 1996, hospitals and residents in 2001 for hospitals without residents in 1996, by 2001 residency program size

			Number of Hospitals				Number of Residents			
Number of Residents at the Hospital, 2001			Geographic Location of Hospital				Geographic Location of Hospital			
				Urban				Urban		
greater than	and	less than or equal to	Rural	Large	Other	Total	Rural	Large	Other	Total
0		10	29	58	31	118	60.25	162.76	100.91	323.92
10		20	3	6	5	14	37.09	78.34	65.94	181.37
20		50	0	3	4	7	0	68.54	99.70	168.24
Totals			32	67	40	139	97.34	309.64	266.55	673.53

SOURCE: Medicare Cost Reports, 1996 and 2001. All teaching hospitals except HHC and other selected hospitals with missing MCRs for some years.

Run: jimw05, 4/5/05

APPENDIX 9.C
GME REDUCTION FORMULAS

APPENDIX 9.C
FORECASTED GME PAYMENT REDUCTIONS

The other set of bite measures we calculate uses the Medicare volumes, Case Mix Index, ratio of outlier to inlier payments, ratio of simulated Medicare managed care to inlier payments, number of residents, number of beds, and total volumes in the hospital in 1996 rather than in the current year to determine the BBA/BBRA bite. Because simulated Medicare managed care payments were not available for hospitals' FY1996 MCRs (and most hospitals' FY1997 MCRs), we use the FY1998 ratio of simulated Medicare managed care to inlier payments. This bite measure can be interpreted as a measure of a hospital's expectation of the GME-related bite, assuming no change in the hospital's size (beds or patient volume), case mix, payer mix, or resident counts. In addition, the difference between this "expected" bite and the actuarial bite can give an estimate of how changes in hospitals' size, case mix, payer mix, or resident count may have affected their impact of the BBA and BBRA.

To compute the expected IME bite, an expected inlier payment was computed according to the following formula:

$$[\text{Expected IME Bite}]_{h,t} = \underbrace{[\text{Updated Federal Rate}]_{h,t} \times [\text{Medicare Discharges}]_{h,96} \times [\text{CMI}]_{h,96}}_{\text{Expected Inlier Payment}} \times$$

$$\underbrace{\left[\left(1 + a_t \frac{[\text{Outlier}]_{h,96}}{[\text{Inlier}]_{h,96}} + b_t \frac{[\text{Managed Care}]_{h,98}}{[\text{Inlier}]_{h,98}}\right) \times c_t - \left(1 + \frac{[\text{Outlier}]_{h,96}}{[\text{Inlier}]_{h,96}}\right) \times 1.89\right]}_{\text{Difference in Product of IME Payment Base and IME Multiplier}} \times$$

$$\underbrace{\left[\left(1 + [\text{IRB}]_{h,96}\right)^{0.405} - 1\right]}_{\text{Teaching Effect}}$$

First, an expected Federal rate was computed by adding the wage index-adjusted labor-related share to the COLA-adjusted non-labor-related share and multiplying the result by the pre-BBA cumulative statutory annual update factors (using actual CPI-U growth rates). Then, the expected Federal rate was multiplied by the hospital's 1996 number of Medicare discharges and CMI to compute the expected inlier payment for hospital *h* for year *t*. The expected outlier payment is computed by multiplying the expected inlier payment by the 1996 ratio of outlier to inlier payments, and the expected simulated Medicare managed care payment was calculated similarly. The expected IME payment base was computed using the BBA and BBRA IME payment parameters a_t and b_t shown in Table 9-10. The expected IME payment base was then multiplied by the IME multiplier c_t and by the teaching effect. The “no-BBA” expected payment is computed similarly but instead always includes expected outlier payments in the IME base and uses 1.89 as the IME multiplier. The expected IME bite is the difference of these two quantities.

The expected Direct GME bite was computed using the following formula:

$$
\begin{aligned}
&[\text{Expected Direct GME Bite}]_{h,t} = \frac{[\text{FFS Days}]_{h,96}}{[\text{Hospital Days}]_{h,96}} \times \\
&\underbrace{\begin{aligned}&\big[[\text{Primary Care FTE}]_{h,96} \times \big([\text{Primary Care Amount}]_{h,t} - [\text{Primary Care Amount}]_{h,t} \times [\text{CPI - U}]_t\big) + \\ &[\text{Specialty FTE}]_{h,96} \times \big([\text{Specialty Amount}]_{h,t} - [\text{Specialty Amount}]_{h,96} \times [\text{CPI - U}]_t\big)\big] +\end{aligned}}_{\text{Component Affected by Per-Resident Amount Ceilings and Floors}} \\
&\underbrace{\begin{aligned}&b_t \frac{[\text{Managed Care Days}]_{h,98}}{[\text{Hospital Days}]_{h,96}} \times \big([\text{Primary Care FTE}]_{h,96} \times [\text{Primary Care Amount}]_{h,t} + \\ &[\text{Specialty FTE}]_{h,96} \times [\text{Specialty Amount}]_{h,t}\big),\end{aligned}}_{\text{Component Caused by Phase-In of Medicare Managed Care Dependence}}
\end{aligned}
$$

where b_t is the Medicare managed care phase-in proportion shown in Table 9-10. We assume that the hospital’s Medicare day share and number of residents will be the same in years t after 1996. As a result, the expected DME bite will be the sum of two components. The first is due to the impact of the ceilings and floors on the per-resident amounts; since we assume hospitals expect to keep their resident counts at their 1996 levels, the resident count caps will have a negligible effect on the expected bite. The second component is due to the phasing-in of the use of Medicare managed care days in the computation of the Medicare dependence. Note that this component will be positive since there is no corresponding reduction in the Direct GME payment base elsewhere.