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Assessment of the Potential Impact of Productivity Changes on Medicare RVUs

Final Report

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1.1 Introduction

1.1.1 Development of Harvard Work Relative Value Units

In the early 1980s, Hsiao and colleagues at Harvard University developed a conceptual framework for defining resource costs of providing physician services (Hsiao, 1979; Hsiao, 1985). In doing so, the researchers needed to overcome several major methodological challenges: developing reliable and valid methods of measuring physician work; developing a method to align the scale of physician work across different specialties; and developing survey methods that could be used to obtain reliable estimates of work effort from national samples of physicians. The model for the Resource-Based Relative Value Scale (RBRVS) developed by Hsiao and colleagues contains three resource inputs for the provision of physician services: total work, an index of relative practice costs by specialty, and an index of amortized value for the opportunity costs of specialty training (Hsiao *et al.*, 1992a). Based upon the successful development of this conceptual framework, the Centers for Medicare & Medicaid Services funded Hsiao and his colleagues at Harvard, in collaboration with the American Medical Association (AMA) to develop a resource-based relative value scale to be used as the basis of payment for physician services to Medicare beneficiaries starting in 1992. Relative values within families of codes (e.g., heart surgery, radiological scans) were then linked using a reference set of Multiple Points of Comparison (MPCs) (Morton, Kominski, Kahan, 1994). The new resource-based system was predicted to increase fees for physician visits by 15–45% while reducing the income of most surgical specialties by 10–20% (Hsiao *et al.*, 1992b).

1.1.2 Growing Concerns over Efficiency & Equity of the Medicare Fee Schedule

In the first 15 years of the Medicare fee schedule there have been growing concerns that its alleged benefits in controlling physician outlays and recalibrating fees and specialty incomes in a more equitable and efficient manner have not materialized. The Physician Payment Review Commission (PPRC) and the Medicare Payment Advisory Commission (MedPAC) has published several reports critiquing various aspects of the system. The PPRC (1993, p. 190) early on warned CMS against implementing a review "process that is not biased toward increasing relative values." The PPRC (1997, pp. 279-82) reiterated its concern about ensuing biases in updating fees for Evaluation & Management (E&M) visits provided in large part by primary care physicians. The commission was also concerned about equating the work in post-operative visits by surgeons with the work of primary care physicians seeing patients and documenting their care in the office. Fast-forwarding to 2005, MedPAC (March 2005) expressed heightened concern over the negative impact of rapid growth in physician volumes on allowable updates in physician fees under the Sustainable Growth Rate legislation in the Medicare Drug Improvement and Modernization Act (MMA). Finding that overall "current Medicare payments for physician services were adequate," the commission recommended that the government adopt "a productivity objective, or goal, to encourage provider efficiency" (p. 82).[1] The commission also

[1] For two excellent, recent, analyses of productivity growth in the physician sector, see Fisher (2007) and Newhouse and Sinaiko (2007). Each discusses the major challenges to developing accurate productivity measures in this sector.

expressed concern over the unbundling of imaging services that is facilitated by a fractionated coding system as well as the appropriate rates and payment levels associated with burgeoning tele-radiology (p. 163). Then, a year later, MedPAC (2006) "concluded that CMS relies too heavily on physician specialty societies" in adjusting fees and recommended to the DHHS Secretary that he

- Should establish a standing panel of experts to assist CMS in identifying overvalued services and in reviewing Relative Value Update Committee (RUC) recommendations

- Should initiate a 5-year review of services experiencing substantial changes in length of stay, site of service, volume, practice expense, and other factors affecting physician work

- Should review the work relative values for selected recently introduced services

- Should review all services periodically.

MedPAC commissioners were particularly eager for CMS to "rebalance" the review process by expanding the backgrounds and expertise of panelists involved in the periodic reviews.

Finally, two very recent studies have again raised serious questions about how the Medicare Fee Schedule system has evolved from its early beginnings as a system rigorously grounded in resource use. First, Ginsburg and Berenson (2007) note that "relative values have defied gravity—going up or staying the same but rarely coming down" (p.1201) The authors lay particular blame for this phenomenon on the absence of any attempt to adjust work effort for productivity changes. They cite the example of how an initial 20% increase in the work values of all E&M visits was reduced to only 8% after adjusting for Congressionally mandated budget neutrality (p. 1202). The culprit in their eyes is "the absence of reductions [for productivity gains] for important procedures…" (p. 1203) With no offsetting reductions in work RVUs among many other services, budget neutrality deflates most of the potential gains to E&M visits, resulting in "much activity [but] little change." Lacking sufficient resources to improve the update process, according to the authors, CMS leaves the RBRVS fee schedule on "automatic pilot" to attend to more pressing policy concerns.

Second, Maxwell, Zuckerman, and Berenson (2007) take a detailed look at the forces driving the 50% increase in the volume of physician work RVUs per beneficiary during the first decade of the Medicare Fee Schedule. New service codes added between 1992 and 2002 were the single largest driver of volume growth (36 of 50 percentage points). Cardiology and gastroenterology specialties exhibited the greatest overall RVU growth in work effort. The authors also expressed concern over the future of the system by noting the continued "lack of a mechanism for identifying and correcting overvalued services" (p. 1859) as evidenced by the results of the third in a series of 5-year reviews that were mandated by the Congress when the fee schedule was adopted in 1992.

Given these criticisms about how these periodic reviews have been conducted, we next provide a brief synopsis of each review.

1.1.3 The First 5-Year Review

Section 1848(c)(2)(B)(1) of the Social Security Act requires that CMS review all relative value units (RVUs) for services in the RBRVS Medicare Fee Schedule (MFS) at least once every 5 years. Since the MFS was implemented on January 1, 1992, CMS has completed three 5-year reviews along with annual reviews of new and revised service codes. To conduct the reviews, CMS relies extensively on the AMA's Relative Value Update Committee (RUC) that was formed in 1991 with 28 members representing the major specialties. The process begins with CMS, in the Federal Register, requesting public comments on the physician work RVUs for all services in the physician fee schedule. In its first notice, CMS was particularly interested in comments on services for which medical practice had changed since the Harvard surveys performed 6–8 years earlier. By the end of the comment period, CMS had received in excess of 500 public comments covering 1,100 services. After review of the comments by CMS' medical staff, approximately 700 codes were forwarded to the RUC for review. CMS also forwarded to the RUC roughly 300 codes that it believed were misvalued. A process similar to that used for the annual updating and as described above was used to evaluate the proposed changes to the work RVUs.

The results of the 5-year review were published in the May 3, 1996 Federal Register (1996). Overall, CMS decided to increase work for 28% of the studied codes, decrease work for 11% of the codes, and leave unchanged the values for 61% of the codes. For 93% of the codes, HCFA agreed with the RUC's recommendations. Detailed discussions of changes in work RVUs for families of services were also provided. Of note was the in-depth review of work involved in the provision of office and hospital visits and consultations. The RUC agreed with the commenters that many of these evaluation and management (E&M) services required modification and submitted to CMS a recommendation to increase the work RVUs for 39 of the 98 E&M services evaluated. Upon its review, CMS found the RUC's recommendations to have inconsistencies that would have significantly altered the existing relationships among all the evaluation and management services without providing compelling reasons to do so. Based upon its examination of these services, CMS revised upwards the work RVUs for the majority of E&M services; thereby moving the work intensity of E&M services closer to procedural services.

1.1.4 The Second 5-Year Review

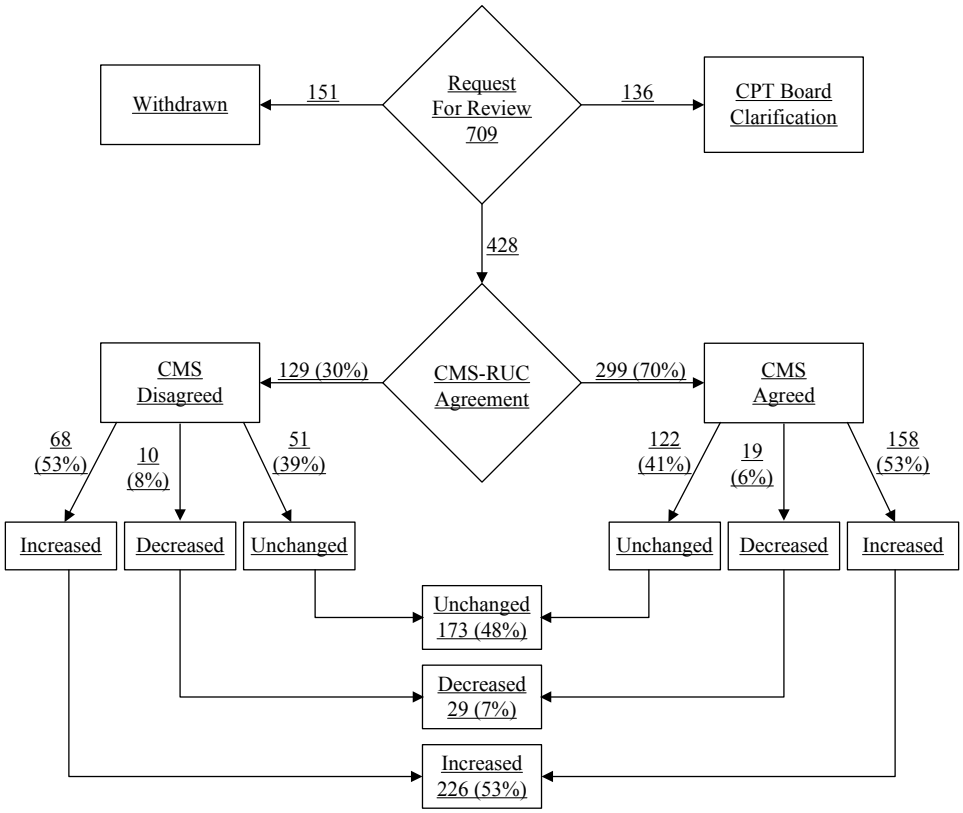
In the second 5-year review, CMS received comments on over 900 codes and accepted 92% of the RUC's recommended changes in work RVUs (Federal Register, November 15, 2004). Public commenters, mostly specialists, had requested increases in the work RVUs for 93% of the codes they submitted and decreases for only 4% of codes. As a result of RUC recommendations, CMS increased work RVUs for 64% of reviewed codes and decreased work effort and RVUs for only 2% of codes.

We now turn to a more in-depth summary and analysis of the third 5-year review to illustrate the mechanisms used to review codes and the challenges to CMS in identifying and accounting for productivity gains in adjusting work RVUs.

1.1.5 The Third 5-Year Review

In preparation for the third 5-year update of physician work RVUs, CMS received 709 requests for review of specific codes (Fed. Register, June 29, 2006). Of these, 136 were submitted to the CPT Board for further clarification with no change in RVUs (see ***Figure 1-1***; ***Appendix 1A*** for complete listing of code disposition). Another 151 were withdrawn by the medical societies and not investigated further.

Figure 1-1
Disposition of Requested Physician Work RVU Changes by CMS & RUC, Third 5-Year Review, 2006



This left 428 codes for review that were sent to the RUC.[2] Of these codes, CMS *agreed* with the RUC on the recommended change in work RVUs for 299: 158 (53%) codes were increased; 19 (6%) were decreased, and 122 (41%) remained unchanged. (These percentages differ only slightly from CMS' figures; Fed. Register, June 29, 2006, p. 37173). The average RVU increase was 0.75 RVUs. Roughly six-in-10 codes with an increase were increased more than one full RVU while only one-in-six codes experienced a decrease of greater than one RVU. According to our calculations, CMS *disagreed* with the RUC recommendation on 129 codes resulting in 68 (53%) increases; 10 (8%) decreases; and 51 (39%) remained unchanged. This

[2] Based on our analysis of Table 1 in the Federal Register, we find six more codes in which CMS disagreed with the RUC than CMS indicated.

distribution is quite different from the one reported by CMS in the Federal Register. Our figures are based on the difference between CMS' final work RVUs and the previous 2005 work RVUs while CMS reports figures based on its differences with the RUC recommendations. Consequently, when CMS reports reducing RVUs for 72 (of "disagreement" 123) codes, the agency still proposed increases in most cases over the previous work RVUs. CMS did not report the total number of codes under review that eventually had increases or decreases.

According to our figures (see Figure 1-1), of the 428 codes actually reviewed, 53% were increased, 40% were unchanged, and only 7% were decreased. Because the number of codes reviewed in the 5-year review are only a small fraction of all MFS codes involving physician work, the 7% that were reduced is only a fraction of 1% of all codes.

Requested increases in work RVUs, mainly by medical societies, were far higher than what the RUC and CMS finally approved. Of the 489 codes with requested changes, 83% were for increases and 4% were for decreases. (More codes have requested increases than have RUC recommendations because many were referred to the CPT Board for further clarification.) Five of the 19 codes with requested reductions in work effort involved skin procedures, including code 19004 (Destroy lesions, 15+) with a request to lower its RVUs from 2.79 to 2.20. The RUC went further and recommended only 1.80 RVUs while CMS disagreed with the RUC and proposed only 1.58 RVUs. Code 33141 (Transmyocardial laser revascularization) had the largest requested reduction of 2.40 work RVUs, a 50% reduction. Although the RUC recommended such a reduction, CMS rejected the request and left the code unchanged (for reasons discussed later in this section).

Several reasons were given in the Federal Register by medical societies for the requested increases:

- Correct rank order anomalies
- Code not reviewed previously by sub-specialty physicians (e.g., otolaryngologists)
- Change in patient population
- Flawed methodology in previous 5-year reviews
- Use of alternative "building-block" approach that sums reported work effort for pre- and post-intra services instead of single global estimate of work effort.
- Adding more critical care intensive care unit (ICU) days to global package
- Use of society's alternative data base rather than physician surveys
- Use of society's own intra-service work per unit time (IWPUT) value in conjunction with society's new intra-service time data
- Rejection of MPC reference code's RVU value.

The RUC also had various reasons for generally approving or rejecting the society's request for more RVUs:

- More than 50% of survey respondents did not think work effort had changed
- Accepted the 75%ile of work effort instead of the typical 50% threshold
- Accepted use of society's independent clinical registry information
- Rejected society's survey of intra-service time as being too low
- Rejected reference MPC code RVUs as too low
- Found more diagnoses on claims than for reference codes.

A few examples highlight the RUC-CMS review decision-making process.

Cardiothoracic Surgery. The societies for thoracic surgery (STS) submitted requests for 10–33% increases in work RVUs for nine congenital cardiac surgery codes on the grounds that they were much less commonly performed and had not been surveyed before. Consequently, rank order anomalies had been created. Standard member surveys were conducted resulting in low response rates. The RUC agreed that a number of reference procedures had inaccurate physician times relative to the surveyed times. Based on the limited survey data, the RUC either agreed with the society's request or made small reductions that still increased work RVUs substantially. CMS agreed to the increases without comment (Fed. Register, June 29, 2006, p. 37224). Apparently, no consideration was given to reducing work effort of any of the reference procedures, resulting only in increases for the nine procedures.

The societies also submitted 46 adult cardiac codes for review that includes most valve and heart bypass surgeries. Many had their RVUs increased by 10–25 RVUs (p. 37224), including code 33305 (Repair of heart wound) had a requested increase from 21.41 to 74.23 work RVUs. The societies proposed their own STS database on times and RVUs as well as a building block, piece-meal, approach to determining total work RVUs. Their approach derived an IWPUT value from both magnitude and RASCH methods then converted the RASCH scales to RVUs using regression estimation.[3] CMS rejected nearly all of the RUC's recommendations because of its reliance on the STS database is a voluntary registry, dependent on academic medical centers, with a disproportionate number of complex cases (p. 37224). CMS was also concerned about using mean rather than standard median times.

CMS' main concern, though, was in using relative times alone to determine RVUs instead of using physician subjective rankings of relative work effort based on surveys. CMS rejected the use of the novel RASCH approach because it was inconsistent with the magnitude estimation method used for all other MFS codes. In proposing updated RVUs, CMS assumed

[3] Georg Rasch developed a psychometric method for quantifying the relative weight or value of items using a paired comparison technique (Andrich, 1988). Multiple respondents score two items on more or less work that are converted, using a binomial distribution, into a (logged) scale of relative difficulty.

that the incremental increase in RVUs across codes from the second 5-year review were still correct. It calculated an IWPUT for each code from the second 5-year review data and multiplied this factor times the newly reported physician intra-service times in the STS database. This approach had two effects. While it greatly reduced the RUC's recommended increases in RVUs, it still increased RVUs by 5–15 RVUs for most of the reviewed cardiac codes. None of the codes were assigned lower work RVUs because CMS accepted the STS data that showed increases in intra-service times—despite rejecting the use of the STS data base when used by the RUC.

Finally, CMS had also requested that the RUC review code 32020 (Tube thoracostomy), but the RUC made no recommendation due to a "lack of a level of interest for surveying this code [by the societies]" (p. 37226). Because CMS continued to believe that the service was misvalued, it decided that this code's work effort was similar to code 38300 (Drainage of lymph node abscess; simple) or code 38500 (Biopsy or excision of lymph nodes) with 3.29 RVUs and lowered the RVUs by 17%. No explanation is provided why these two codes require identical work effort to code 32020.

General, Colorectal Surgery. The American College of Surgeons (ACS) submitted many codes for review. Like the thoracic surgeon societies, the ACS used a building-block approach and a special VA database to estimate new surgical times and RVUs. The RUC recommended using either the 25th or 75th percentile work thresholds for some codes to better fit with the reference code or to avoid rank order anomalies.

Because the 5-year review process allows societies and the RUC to also review additional codes that might be anomalous once other codes were changed, the RUC reviewed the 6 total colectomy codes and increased their RVUs by 3–5 RVUs. CMS concurred with the RUC.

The RUC also agreed with the ACS that the proctoscopy-anoscopy codes were inconsistent with the reference code and used its IWPUT approach instead. CMS rejected these recommendations for increases and left the RVUs unchanged, most of which being less than 1.0 RVUs.

Orthopedic Surgery. CMS was interested in the RUC reviewing total hip and knee replacement surgeries (codes 27130, 27236, 27447). Instead of conducting member surveys, the specialty society rejected the vignettes for these surgeries and based its requests on the VA and DRG databases. The RUC rejected this methodology and proposed to keep the RVUs unchanged. CMS then rejected the RUC's recommendations. It decided to equate the work effort of 27130 (Total hip replacement) with codes 43641 (Vagotomy) and 60260 (Thyroidectomy); code 27236 (Open treatment of femoral fracture) with code 34421 (Thrombectomy) and 47600 (Cholecystectomy); and code 27447 (Total knee replacement) with code 35671 (Bypass graft, with other than vein). The result was to lower work RVUs by 2–4 units.

The society also submitted a large number of fracture codes with the concern that each code included both internal and external fixation. These codes were sent by the RUC to the CPT Board for clarification.

E&M Visits. In preparation for the third 5-year review, consortium of 27 specialty organizations submitted a consensus letter to CMS stating that E&M work effort had changed

since the first 5-year review. No increases were requested for the lower-RVU office visits, but the more complex office visits were believed to have increased in work RVUs by 50–100%. Hospital visits were also requested to increase by similar percentages while office consults requested increases were about 25%. The RUC convened a workgroup to evaluate the recommendations of the 27 specialty societies requesting increases as well as a coalition of surgical specialties arguing against any changes in E&M work effort (p. 37217). The RUC eventually recommended to CMS to increase all of the reviewed E&M codes, but by a smaller amount than requested.

In concurring with all of the RUC's E&M recommendations, CMS provided insight to the RUC process by incorporating the RUC's notes on how it arrived at the 37% increase in one code, 99213, an intermediate office visit (originally with a value of 1.0 in 1992). E&M code 99213 is the most billed code by physicians in the entire MFS. The RUC concluded that "the assumptions made by Harvard and CMS were flawed [regarding 99213]" (p. 37218). The RUC workgroup agreed that 99213 involved slightly more work than 99202 (a "straightforward" new patient with an expanded problem focused history) that was valued at 0.88. The RUC also found more diagnoses on 99213 versus 99202 claims. Based on their new physician survey showing that median work was 1.10 for 99213 and 1.05 for 99202, the RUC multiplied the 0.88 RVUs for 99202 by (1.1/1.05) to arrive at a recommended value of 0.92 RVUs for 99213, a 37% increase over 0.67. The RUC also recommended incorporating the E&M increases into the global surgery RVUs.

Impact of RVU Changes on Budget Neutrality. Section 1848(c)(2)(B)(ii) of the Social Security Act requires CMS to maintain budget neutrality in making adjustments to the physician work RVUs (Fed. Register, 2006, p. 37253). This can be done either by reducing the overall conversion factor, by increasing the total number of RVUs in the denominator, or by maintaining a constant total number of physician RVUs after implementing changes based on the 5-year review. CMS decided to keep total physician RVUs constant rather than change the conversion factor because many HCPCS codes paid using the conversion factor involve no physician work effort (p. 37253). This decision had the effect of isolating budget neutrality change in physician-oriented codes.

According to CMS (p. 37241), the disproportionate increase in work RVUs among reviewed codes required a 10% reduction in work RVUs over all codes to maintain budget neutrality (p. 37253). Consequently, all of the codes not reviewed would have their work RVUs reduced, even though they may have not experienced any reduction in work effort in the last five years. Conversely, some families of codes and the specialties that predominantly provide them were substantial winners in the third 5-year review.

Table 1-1, taken from the June 29, 2006 Federal Register, gives CMS' estimates of the net effects of RVU changes plus budget neutrality adjustments on total Medicare payments to over 50 specialties. The percentage impacts on a particular specialty depend on four factors: (1) any work RVU changes from the third 5-year review; (2) how important work RVUs are to total RVUs for a particular code; (3) the frequency distribution of codes within a specialty, and (4) the proportion of a specialty's revenues from HCPCS codes not subject to the adjustment in work RVUs.

Specialties with the largest allowed charge increases due to changes in work RVUs were

- Infectious Disease (8%)
- Emergency Medicine (7%)
- Endocrinology (6%)
- Family Practice, Internal Medicine, Pulmonary Disease (5%)
- Critical Care (4%).

Specialities with the largest reductions to work effort are anesthesia, dermatology, radiology/pathology, and other non-physician groups that generally had no positive updates to the work RVUs of services they bill most frequently.

It seems clear that both the RUC and CMS continue, with some success, to increase payments flowing to primary care physicians. They do so by increasing the work effort involved in most of the office and hospital physician visit codes. Surgical and medical specialties that were successful in avoiding the negative effects of budget neutrality by raising work RVUs were cardiac surgeons (+3%), rheumatology (+3%), thoracic surgery (+2%), neurology (+2%), urology (+1%), and allergy (1%), as well as those listed above that are E&M oriented. Large increases in the E&M codes, however, imply a disproportionate financial burden on those specialties that do not bill E&M codes, such as anesthesia.

Problems Exemplified by the Third 5-year Review Process. The justification for greater E&M work effort in much of the third 5-year review is not always compelling. Many of the increases keyed off a single E&M code's RVUs that were assumed constant or were judged equivalent in work to a very different code such as a complete echocardiographic exam. As we show later in this report, evidence exists for declines, not increases, in most of the new patient and consult E&M visit codes. Little consideration has been given to the possibility that both E&M and many specialty codes are overvalued due to greater physician productivity and should have reductions in their work RVUs—some more than others. The result of such an adjustment might still produce increases in many E&M work RVUs, but it would also call for a lower overall update in the conversion factor for productivity gains.

Table 1-1
Total Allowed Charge Impact for the 5-Year Review of Work RVUs and Proposed PE RVUs

	Specialty	Allowed Charges (millions)	Impact of Work RVU Changes
			2007
1	Total	$74,749	0%
2	ALLERGY/IMMUNOLOGY	167	1
3	ANESTHESIOLOGY	1,710	-6
4	CARDIAC SURGERY	389	3
5	CARDIOLOGY	7,462	-0
6	COLON AND RECTAL SURGERY	120	-1
7	CRITICAL CARE	171	4
8	DERMATOLOGY	2,145	-5
9	EMERGENCY MEDICINE	1,989	7
10	ENDOCRINOLOGY	319	6
11	FAMILY PRACTICE	4,809	5
12	GASTROENTEROLOGY	1,734	-1
13	GENERAL PRACTICE	1,016	3
14	GENERAL SURGERY	2,321	0
15	GERIATRICS	132	2
16	HAND SURGERY	76	-1
17	HEMATOLOGY/ONCOLOGY	1,761	3
18	INFECTIOUS DISEASE	450	8
19	INTERNAL MEDICINE	9,510	5
20	INTERVENTIONAL RADIOLOGY	233	-5
21	NEPHROLOGY	1,585	0
22	NEUROLOGY	1,331	2
23	NEUROSURGERY	571	-1
24	NUCLEAR MEDICINE	86	-6
25	OBSTETRICS/GYNECOLOGY	623	1
26	OPHTHALMOLOGY	4,786	-2
27	ORTHOPEDIC SURGERY	3,265	-2
28	OTOLARNGOLOGY	892	0
29	PATHOLOGY	934	-5
30	PEDIATRICS	73	2
31	PHYSICAL MEDICINE	785	2
32	PLASTIC SURGERY	279	-1
33	PSYCHIATRY	1,128	-2
34	PULMONARY DISEASE	1,580	5
35	RADIATION ONCOLOGY	1,448	-2
36	RADIOLOGY	5,365	-5
37	RHEUMATOLOGY	469	3
38	THORACIC SURGERY	442	2
39	UROLOGY	1,949	1
40	VASCULAR SURGERY	606	-1

(continued)

Table 1-1 (continued)
Total Allowed Charge Impact for the 5-Year Review of Work RVUs and Proposed PE RVUs

	Specialty	Allowed Charges (millions)	Impact of Work RVU Changes
			2007
41	AUDIOLOGIST	31	-1
42	CHIROPRACTOR	774	-7
43	CLINICAL PSYCHOLOGIST	554	-7
44	CLINICAL SOCIAL WORKER	362	-7
45	NURSE ANESTHETIST	651	-8
46	NURSE PRACTITIONER	710	0
47	OPTOMETRY	838	-2
43	ORALMAXILLOFACIAL SURGERY	37	-2
49	PHYSICAL/OCCUPATIONAL THERAPY	1,593	-6
50	PHYSICIANS ASSISTANT	537	1
51	PODIATRY	1,541	-3
52	DIAGNOSTIC TESTING FACILITY	1,214	-1
53	INDEPENDENT LABORATORY	665	-2
54	PORTABLE X-RAY SUPPLIER	87	-1

NOTE: *Components may not sum to total due to rounding.

SOURCE: Federal Register June 29, 2006.

From the many rationales used by specialty societies, the RUC, and CMS, it is not surprising that 53% of reviewed codes eventually had their work RVUs increased and only 7% were decreased. Besides the fact that 83% of requests were for increases to begin with, society arguments for "correcting rank order anomalies," "flawed previous reviews," using a "building-block" rather than a global work approach, providing "new times from special society clinical registries," and "rejection of the work involved in reference codes," all played a part in the upward bias in setting new work RVUs. To CMS' credit, it rejected some of the societies' novel methods, although the RASCH method used by the cardiac and orthopedic surgeons may be less biased than the current magnitude estimation approach. CMS also appreciated the new database on times used by some societies, but chose to use only its times and not the IWPUT values. CMS did not have much luck with the RUC in having some procedure RVUs reduced, in which case work effort remained unchanged or CMS used an IWPUT method than deviated from its own stated approved methodology. On the RUC's part, it occasionally rejected surveyed times as being too low without justification and decided to use an alternative approach based on IWPUT, which CMS generally rejected.

In CMS' summary of actions in the Federal Register, CMS did disagree with the RUC's recommendation 30% of the time; yet, the agency's ultimate decisions resulted in actual increases, not decreases, in work RVUs 53% of the time when it disagreed. Disagreeing with the RUC does not generally mean that RVUs were reduced. Interestingly, whether CMS agreed or disagreed with the RUC's recommendation had no effect on the final probability of increasing work RVUs; it was 53% across-the-board with only 7% of codes reduced on average.

1.2 Purposes of the Study

Given the problems with the three 5-year reviews, and especially the lack of any systematic approach to accounting for increased productivity in physicians' practices, DHHS/ASPE funded Research Triangle Institute to assess the potential impact of productivity changes on work RVUs. Our work has involved, first,

- Identifying groups of services that most likely have undergone significant changes in practice patterns that should generate productivity gains for physicians and lower work RVUs.

Based on suggestions from an expert physician panel, we then conducted research in five separate areas than form the analytic sections of our report:

- A comparison of CPT guideline times for E&M visits with times reported in the National Ambulatory Medical Care Survey (NAMCS)

- A validation of operating room times based on medical society subjective surveys using objective operating room log data

- An analysis of trends in post-operative follow-up visits for a select set of surgeries that indicate a greater frequency of patient "hand-offs" to other physicians thereby reducing the total time that surgeons spend with patients

- An analysis of trends in the work effort per unit of time that surgeons spend in performing a set of study surgeries

- An analysis of trends in RVUs and work per unit time for hundreds of Multiple Points of Comparison services that link the relative rankings of procedures across different specialties

- An investigation into how private insurers use the Medicare Fee Schedule and work RVUs to pay physicians and what adjustments they may make for productivity changes.

1.3 Summary of Key Findings

Based on our previous research (McCall *et al.*, 1999), we identified four major drivers of productivity gains in physicians' practices:

- Substituting new technologies for physician time and effort

- Substituting support personnel for physician time

- Learning-by-experience in performing procedures and seeing patients

- Re-engineering services that reduce physicians' time with patients.

We then organized a panel of physician experts in selected specialties. Their task was to identify a set of services that have experienced substantial productivity gains for one or more of the reasons listed above. Based on a few service scenarios that we provided to the panelists, they provided us with an extensive list of services and special studies that could illustrate the kinds of productivity gains occurring in their respective fields. From their suggestions, we organized a research agenda around the following topics:

- Differences between CPT guideline times for office visits and times reported in a long-standing national government survey of office practices
- Differences in intra-service surgical times reported in AMA-RUC-sponsored physician surveys and times found in hospital operating room logs
- Trends in "hand-offs" from surgeons to other physicians following up patient care after surgery
- Trends in global surgical times, RVUs, and work per unit time for selected surgeries and the Multiple Points of Comparison that link services across specialties
- Use & modifications of the Medicare Fee Schedule RVUs by private insurers.

Thirty-five CPT surgery codes were selected and grouped into seven broad surgery groups:

- Orthopedic
- Cardiothoracic
- Vascular
- General & Colorectal
- Urologic
- Gynecological
- Neurosurgery.

In addition, we analyzed trends in work RVUs and WPUT[4] for 361 Multiple Points of Comparison (out of over 400) that had the necessary data reported for the 1992-2006 life history of the Medicare Fee Schedule.

Below is a summary of our key findings organized by study area.

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[4] WPUT is the ratio of mean total work reported by physicians for a service divided by their estimate of the total time required.

1.3.1 CPT Guideline versus Reported Face-to-Face Physician Office Times with Patients

Fifteen new, established, and consult office visit times used as CMS guidelines in determining work effort were compared with the National Ambulatory Medical Care Survey (NAMCS) that asks physicians how much time they spent face-to-face with patients on up to 30 office visits. Office visit lengths are critical in evaluating work effort because they have been shown to be highly correlated with subjective rankings of work effort by physicians (Braun *et al.*, 1992). Based on a nationally representative sample of physicians and their Medicare patients, 1997/1998 average face-to-face visit length was 8.8% (1.7 minutes) shorter in NAMCS compared with a visit length imputed from the mix of visit CPT codes that physicians billed Medicare (McCall *et al.*, 2001; Cromwell *et al.*, 2006). In the current study, we extended our work through 2002/2003. We found a narrowing of the discrepancy, but NAMCS' average visit times were still 3.4% shorter than expected based on Medicare claims. Both differences were statistically significant at the 95% confidence level.

Average differences, however, mask much larger differences found among the new office and consult visits. When these 10 visit types are combined, NAMCS' reported times were 26% shorter than times based on billed Medicare claims in 1997/1998 (McCall *et al.*, 2001; Cromwell *et al.*, 2006). When we re-examined these visits in 2002/2003, we found that the gap had widened to 36% (i.e., 40 versus 25 minutes).

Two explanations for our findings are possible. First, it is possible that over time physicians are spending less time with patients and becoming more productive (assuming no decline in outcomes) compared with the times reported in the original Harvard studies of the early 1990s. Alternatively, physicians may be upcoding their visits over time to higher-paying codes that also imply longer times when, in fact, times with patients have not increased—especially for new office and consult visits. It seems reasonable to expect both types of physician behavior are occurring. Previous CMS investigations have uncovered extensive upcoding of visits (Part B News, March 27, 2000). However, the very long visit lengths for new and consult patients appearing in the CPT manual are based on early 1990s estimates and seem unlikely 10-12 years later. For example, the two most complex new patient codes involve 45–60 face-to-face minutes in the CPT manual. The two most complex consult codes involve 60–80 minutes. Moreover, the frequency of the two complex consult codes increased by over 40% in just the 5 years between 1997/1998 and 2002/2003 while adding $340 million to Medicare outlays in a single year. Overall, the shift to higher paying E&M visit codes generated $4.7 billion in additional Medicare spending (in 2002/03) annually, not counting payment increases within codes.

Over the same (and longer) period, CMS and the RUC have greatly increased the work RVUs of physicians in their offices. For example, physician work RVUs for an intermediate office visit has been increased from 0.59 (1992) to 0.67 (1999) to 0.92 (2006) RVUs—an increase of over 50% (Federal Registers, selected years). Such large increases do not seem to be grounded in quantified increases in face-to-face times with patients. At the same time, practice expense RVUs that cover support personnel in the office have declined from 0.38 to 0.28. This seems counter-intuitive given the growing delegation of physicians to allied health providers in their practices. In CMS' explanations for raising office visit work effort, it is clear that the

agency is primarily concerned about the existing bias in the 5-year review process in favor of procedures over cognitive visits with patients. Little consideration appears to have been given to the possibility that productivity gains have been occurring across all types of procedures and visits that would imply reductions in work RVUs. For visits alone, work effort for new and consult patients appears to be overstated, and Medicare should be sharing in the productivity gains generated by providers.

1.3.2 Intra-operative Surgical Times from Specialty Surveys versus Operating Room Logs

Before this current study, RTI staff had already completed an extensive analysis for CMS of the accuracy of the intra-operative times for 60 surgical procedures prior to the second 5-year review (McCall *et al.*, 2001; McCall *et al.*, 2006). The results showed much longer surgery times reported by the specialty societies to the RUC compared with objective data from a sample of operating room logs for the same procedures. In our current study, we updated our analysis using a smaller set of 17 surgical codes for the 2001–2005 period.

With few exceptions, we observe the same pattern of longer surgery times reported by surgeons and the RUC compared with actual operating room logs. All 17 surgeries exhibited statistically longer surgeon-RUC reported times. The longer specialty society times ranged from 8 minutes for a diagnostic bronchoscopy to one-and-a-half hours longer for a radical nephrectomy. On a percentage basis, the range was 17% longer for hip hemiarthroplasty to 281% longer for an ureteroscopy with stone extraction. Eight of 17 surgeries had surgeon-RUC intra-operative times that were at least 30 minutes longer than times based on operating room logs.

The pattern of longer surgeon-RUC times reported more recently was consistent by hospital location and number of operating rooms in a facility. Stratifying by teaching status, however, revealed longer operating room log times in teaching hospitals that were more similar to those based on surgeon self-reports. A maldistribution of RUC survey respondents tilted towards major teaching hospitals, if it exists, could be a major source of the longer surveyed times.

Shorter operating room log times when compared with the original Harvard times in the early 1990s suggest greater efficiency and substantial surgeon productivity gains over the last 15 years. This is evidence of learning-by-experience, personnel substitution, and the use of more efficient technologies in the operating suite. (See also Cromwell, Mitchell, Stason, 1990, that documented large reductions in heart surgery times in the 15 years before the MFS was implemented).

1.3.3 Trends in Surgeon "Hand-Off" Visits to Other Physicians After Surgery

The Medicare Fee Schedule requires that surgeons bill and be paid a single fee for a global package of services that includes visits before and after surgery as well as the surgery itself. Medicare Claims Review & Adjudication Procedures (1996) provides 23 pages of instructions to carriers in how to pay (or not) for post-operative visits. If the surgeon officially "hands off" the post-operative care related to recovery, this is called a *transfer* and both the surgeon and hand-off physician are required to use appropriate modifiers. A seemingly straightforward process is greatly complicated by language in the manual excluding visits

unrelated to the diagnosis for which the procedure was performed. Physicians, including the surgeon, may bill for post-operative visits in the global window when they are caring for an underlying condition or medical complication unrelated to the surgery itself. Allowing physicians to bill for unrelated care within the global period renders the concept of surgeon responsibility for follow-up management almost meaningless in today's specialized medicine and expanded use of hospitalists and intensivists—especially for Medicare patients who frequently have "underlying medical conditions and complications" in the post-surgical period.

Based on our expert panel recommendations, we identified 32 major surgical procedures in seven broad areas for focused study of hand-offs and growth in the number of post-operative visits and outlays. If related hand-offs are increasing over time, we should see an increasing number of billed post-operative visits, implying less follow-up work of the surgeon. To further isolate hand-offs, we focused on six specialties most likely to be involved in surgical hand-offs: Family Practitioners, Internal Medicine, General Surgery, Hospital Intensivists, Nurse Practitioners, and Physician Assistants. We also focused on new and established office visits, as well as critical care and subsequent hospital visits, as indicators of surgical hand-offs.

Based on our analysis, 90-day post-operative visits by other than the performing surgeon during the global period increased by 16% on average across the seven broad surgery groups and 21% for heart surgery. Hand-off related visits and specialties experienced higher rates of increase in visits per beneficiary between 1995 and 2004 than other types of visits and specialties. Particularly dramatic increases in billed visits, albeit from very low levels, were recorded for critical care intensivists, nurse practitioners, and physician assistants. This provides further evidence of hand-offs from surgeons to other clinicians who are billing Medicare.

Next, we were interested in the factors driving Medicare outlays for post-operative visits mostly for major surgery. In our seven surgical groups, Medicare post-op visit allowed charges (i.e., payments) increased 53% per beneficiary (i.e., patient) between 1995 and 2004, of which 3.4 percentage points was due to transitioning from historical customary/prevailing fees to the fee schedule. During the same period, 1995-2004, the conversion factor increased only 2.7%, explaining very little of the payment increase. Simple counts of post-operative visits per beneficiary increased 16%, explaining about one-third of the allowable charge increase. On a per beneficiary basis, total visit RVUs increased by roughly 45% (accounting for transition effects), or nearly three times the rate of visit growth. Increases of this magnitude imply considerably greater intensity of services per visit, either by physicians or their practice support staff.

How much of the increased RVU intensity per visit and allowed visit charges in the seven surgery groups can be accounted for by CMS-approved increases in work and other RVUs or to shifts in visit mix?

- CMS-approved increases in work RVUs between 1995 and 2004 accounted for slightly less than 20 percentage points of the 53% increase in allowed charges.

- Changes in practice and malpractice expense RVUs were actually negative, thereby reducing allowed charges per beneficiary by 12 percentage points.

- In general, a strong trend exists in physicians billing for more and for higher valued, more resource-intensive, post-operative visits. RVU-weighted visits increased 40% while total visits increased an average 29%, with a net positive effect on change payment growth of roughly 11 percentage points (out of 53 points).

- The shift in post-operative visits to higher RVU codes varied widely across the seven surgery groups, led by orthopedic hip and knee replacements with an 84% increase in the RVU-weighted visit mix.

Increased post-operative visit intensity and work effort could be attributable to greater patient severity. However, while study patients may have more comorbid illnesses in 2004 than in 1995, the age, gender, and racial mix of patients undergoing the surgeries did not change. This seems counter-intuitive given the aging of the Medicare population but is explained by the way the sample was constructed. Patients undergoing one of the 32 major surgeries in 1995 or 2004 were included using Medicare's 5% beneficiary files. It is unlikely that the sampled patients in 1995 also had another major study operation in 2004, and Medicare replenishes deaths in the claims files with new, randomly sampled, beneficiaries each year. Nevertheless, it is likely that the strong growth in visit mix to more RVU-intensive codes is partly due to more comorbid conditions in the elderly population.

1.3.4 Trends in Global Surgery and MPC Times, RVUs, & WPUT

Between 1992 and 2006, the 30 study surgery codes with complete data experienced a 32% increase in their work RVUs, including pre- and post-operative visits. Three surgical codes had over 50% increases in work effort approved by CMS. Only total hip replacement experienced a decline in physician relative work effort, and only because CMS disagreed with the RUC and then compared hip replacement's work effort to a vagotomy and reduced work RVUs during the third 5-year review. Relative to the decline in surgeon work effort for total hip replacement, mitral valve replacement's work effort nearly doubled (82% increase). Hip replacement work effort is now valued at roughly 18 intermediate office visits (99213) while mitral valve replacement is equivalent to 50 intermediate office visits. In the recent 5-year review, CMS disagreed with most all of the RUC recommended increases in work effort for heart surgery. Nevertheless, the agency made only small reductions in the RUC's recommendations and still approved major increases in work effort within the heart surgery codes. It is not clear why such a large gap in work effort has developed, and why CMS has not required a re-examination of the MPCs that link work effort across broad families of codes.

While perceived work effort has been increasing, total times for surgery and associated visits have been declining according to the RUC's surveys of surgeons. Total times fell 8.4%, on average, across the 30 study procedures between 1999 and 2006, the 2 years for which we had available data on times. On an hourly basis, physician work effort (WPUT) increased by 27% over this 7-year period. Only 5 of 30 procedures showed declining work effort per hour. A one-artery bypass experienced an 85% increase in its WPUT between 1999 and 2006. Valued at the 1999 estimated total time, this increase in WPUT generated 21.63 additional RVUs and $808 extra payments per surgery using the 2006 conversion factor. This increase, alone, exceeds the total work, practice, and malpractice RVUs for almost any other service in the Medicare Fee Schedule.

Because CMS staff and its internal workgroup did evaluate work effort per unit time for a few other procedures during the last 3-year review, it is not clear from the Federal Register notice for 2006 why large increases in WPUT of over 80% were allowed for heart surgery.

To our knowledge, no systematic effort has been made to re-evaluate the work effort involved in the Multiple Points of Comparison codes (MPCs) that link RVUs across specialties and families of codes.[5] It is critical to the integrity of the fee schedule that the MPCs maintain their cross-specialty validity in terms of work effort. If some MPCs are being increased more than others and then are being used as references to yet other codes in their family, the relative meaning of the fee schedule is jeopardized.

Based on our analysis, the 361 MPCs with work values in 1992 and 2006 experienced a (RVU-weighted) increase in work RVUs of 20% over the first 15 years of the MFS. This increase is greater than on an unweighted basis (13%), implying that MPCs assigned greater work effort in 1992 received higher than average increases, led by the Respiratory MPCs at 37%. The 31 E&M visit codes as a group experienced a 30% increase in work RVUs as well, although several of these include the higher RVU hospital follow-up visits after surgery. Specialties with little increase in their MPC work RVUs include radiology, pathology, and medicine (mainly special tests).

Wide swings in the ranking of MPCs raise questions about their value in holding the resource-based schedule together in a coherent, meaningful, way. Yet, public commenters in each 5-year review are requested by CMS to use any of the reference codes in grounding their recommended changes in work effort. In addition, surveyed physicians use MPCs of their choice in gauging relative work effort of new or split procedures. Moreover, over 40 new MPCs have been added to the list since 1992 and many dropped from the list. This, again, raises questions about the validity of using a varying set of MPCs in linking work effort across specialties.

Given these findings on major global surgeries and MPCs, it is difficult to reconcile the declining physician productivity implicit in rising work RVUs per procedure accompanied by substantial reductions in the total time that surgeons report spending with patients before, during, and after their surgery. The inclusion of a highly subjective component to work effort, namely, work per unit time, in the quantification of physician input is unprecedented in other industries and calls for a very specific understanding of "productivity." Labor productivity is defined as valued output over labor inputs. In standard industry analysis (e.g., output per manhour statistics by the Bureau of Labor Statistics), output is usually measured as national income (or industry sales) in constant prices (Denison, 1979, ch. 3). Inputs are measured either simply in hours worked or, in detailed economic studies, hour worked adjusted by worker characteristics such as age (proxying on-the-job experience) and education level. There is a clear separation between how output is valued through market demand for final goods and services and how inputs are valued in terms of hours worked and objectively measured characteristics.

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[5] MPCs are codes that CMS, RUC, and Harvard believed to be stable in terms of work effort and that specialties were incurring similar amounts of work.

Physician productivity cannot be measured as in other industries by taking the ratio of inflation-adjusted spending on their services divided by time they spend providing the services. Spending on their services is confounded by the amount and distribution of insurance coverage across services. More extensive coverage of diagnostic surgical procedures distorts the true value that patients place on these services, which was one of the motivations for replacing market-based fees with the Resource-Based Relative Value System (RBRVS). The RBRVS builds up a value for physician output from the product of time-in-service and subjective estimates of work per unit time (WPUT). Because this value becomes the output metric in the physician's productivity ratio, with the TIME variable cancelling out in the numerator and the denominator, WPUT becomes the ultimate productivity indicator. Unfortunately, the numerator of WPUT is a subjective estimate by physicians themselves of the work effort to provide a service and not strictly a value that patients place on the service. It is well established that physicians, when estimating their total work effort for WPUT, take the length of time a service requires into account (Braun, *et al*., 1988a). This involves circular logic in constructing productivity measures for physicians, in that greater time involvement not only raises the denominator, but the numerator as well, leaving productivity rates little changed. Moreover, if some specialties can successfully argue for relatively greater work effort for their services with little (if any) increase in time, their productivity appears to rise substantially along with their payments. Yet, productivity gains in most markets are associated with lower prices, not higher fees, as competition forces producers to share their gains with consumers.

It is interesting that many physician practices use Medicare RVUs as a measure of physician output rather than as an input (Johnson and Newton, 2002). They do so because Medicare keys payment on RVUs and not on the number of quality-adjusted patients treated. But if RVUs are output and not an input measure as in the RBRVs, then the government does not appear to be sharing in the productivity gains of physicians who are seeing and treating more patients and billing for more services per hour. (The productivity adjustment in the MEI is based on the BLS non-farm mutifactor productivity (MFP) index. This index does not accurately represent true productivity change in the physician sector (Fisher, 2006). This is one reason why several researchers have called for basing work effect and fees almost strictly on time as in other industries (Iezzoni, 1999; Kassirer and Angell, 1998; Lasker and Marquis, 1999).

1.3.5 Use and Modifications of the Medicare Fee Schedule RVUs by Private Insurers

In addition to advice and guidance provided by our expert physician panel, we also solicited input from private insurers on when and how they might adjust physician fees for productivity gains. We were particularly interested how they might use the Medicare Fee Schedule to set their fees and what adjustments they make to account for productivity and other changes in the physician sector. Telephone or in-person interviews were conducted with Medical Directors and other senior executives in seven major private insurance companies operating in various parts of the country. They generally believed that trends in the health sector were producing significant efficiencies and reduced physician work effort. Gains were coming from technology substitution in diagnostic imaging, in personnel substitution in the operating room, in learning to use endoscopes faster and safer, and in performing various surgical procedures. Six of the seven organizations reported using the Medicare Fee Schedule as their basic approach to setting fees. Executives felt that Medicare's fee schedule provided authority to fee-setting while

the use of commercial software is convenient and cost-effective in handling the myriad payment edits required.

None of the organizations that we surveyed systematically modified the individual service RVUs for productivity or other changes in physician practice. The main way they differ from Medicare is in using higher monetary conversion factors. The most frequently cited reason for not modifying Medicare's published RVUs was a lack of staff resources necessary to collect and thoroughly analyze data on changes in physician work for hundreds of services. To properly adjust their total fee on each questionable service, they not only would have to conduct studies justifying lower work RVUs, but they would have to make the appropriate increases in practice expense RVUs as well. Even if they were successful in reducing RVUs and payments for some services, the rate of return per research dollar invested may be much lower than in other activities.

Market pressures from specialists also were said to have played a part in not making the sizable investment required to readjust work RVUs. Private payers were concerned over paying competitive fees. Instead of actively changing work RVUs, most organizations applied a "squeaky wheel" strategy by modifying their conversion factors, either for all services or for certain families of codes to satisfy a particular specialty. The executives told us that when they do make modifications in RVUs for specific services, it is always in the *upward* direction (e.g. obstetrical services or anesthesiology services). These adjustments are generally described as "responses to market forces." It was not clear how these pressures were manifested, but the impression was that the payers did not have sufficient market power to adhere to Medicare's conversion factor or even to the plan's own established (higher) conversion factor for that matter. Lack of market power discouraged any systematic attempts to lower fees based on productivity gains.

Another reason for private insurer reticence to adjust relative fees for productivity gains lies in the fact that most payers are insurance companies with a financial and not medical management orientation. Their success is dependent on accurate actuarial analyses and managing the financial risk across subscribers. Plans also rely heavily on the financial returns they make from investing premiums in bonds, stocks, real estate, and the like. Their rate of return to more favorable patient selection and prudent investing is likely much higher than in trying to recalibrate work RVUs for productivity gains. Limited by their market power and bias towards insurance products, clinical experts working for private insurers may be more useful when consulting with CMS, individually, concerning overpriced procedures. This was a recommendation by Physician Payment Review Commission (PPRC) as long ago as 1995 (PPRC, 1995, p. 43).

1.4 Organization of Report

The rest of the report is organized into six sections. Section 2 provides a conceptual background to the measurement of physician productivity and the various “drivers” of productivity gains or losses. Included in this section is a literature review and summary of the expert panel’s findings and recommendations regarding services that have likely experienced significant productivity gains. Section 3 compares the guideline times that appear in the CPT manual for E&M visits with face-to-face times reported in various years on the NAMCS survey.

Section 4 compares the times for selected surgical procedures reported by Harvard and the RUC with operating room log data. Trends in operating room times are also analyzed. Section 5 provides an analysis of post-operative visit growth rates of various kinds by different specialties that might indicate increased productivity for the surgeon. The section also includes a breakdown of factors that explain the increase in allowed charges per surgery between 1995 and 2004. Section 6 has two parts. The first analysis shows changes in RVUs and work per unit time for the same set of surgeries studied in Section 5. A similar methodology is then applied to changes in work effort for the Multiple Points of Comparison (MPCs). If they have become misaligned, then the relative rankings and RVUs within specialty families of codes loses some of their meaning for a resource-based system. Section 7 reports our findings of qualitative interviews with medical directors and senior managers at a few major private health insurers. We report their reliance upon the Medicare RVUs and why they do, or do not, conduct their own analyses of productivity gains that could justify lower payments on certain services.

SECTION 2
SERVICES UNDERGOING PRODUCTIVITY CHANGES & EXPERT PANEL FINDINGS & STUDY RECOMMENDATIONS

2.1 Introduction

This section provides a brief conceptual overview to productivity in the physician sector. The primary sources of productivity gains are enumerated followed by the deliberations and recommendations of an expert physician panel regarding services that have been most impacted by productivity trends in their specialties.

2.2 Sources of Physician Productivity Gains

2.2.1 Critique of Productivity Adjustment in the MEI

The Medicare Economic Index (MEI) that is used to update physician payments for inflation and productivity changes was revised in 1991 along with the implementation of the Medicare Fee Schedule. The MEI is a fixed weight Lasperyes cost-of-practice index (Federal Register, November 25, 1992). Practice input shares (e.g, physician and non-physician time, rent, supplies) are used to weight price proxy increases in each input category to update fees for annual cost increases. The government was concerned that any failure to account for productivity gains in physicians' practices would result in double benefits to providers, once from productivity improvements in their own practices and another from non-physician wage increases that implicitly reflect productivity gains in the general economy (p. 55907). Hence, the price proxies for net incomes of physicians and the wages and fringes of non-physician employees were divided by the 10-year average percent change in the Bureau of Labor Statistics' (BLS) index of non-farm labor productivity.

Fisher (2006) has recently completed a re-examination of the multi-factor productivity index (MFP) that is currently incorporated into the MEI updates to the fee schedule. (In 2003, CMS substituted the non-farm business multifactor productivity index for a simple labor productivity index.) His approach, presented at a CMS conference in Washington, D.C., attempts to quantify productivity gains accruing specifically to physicians' offices rather than to the general economy. Productivity gains are measured as the percentage difference in practice output minus cost-share-weighted percentage changes in capital, labor, and intermediate inputs. Output is measured as physician revenues (from the Bureau of Economic Analysis) divided by the adjusted Physician Producer Price Index (PPI). Inputs are measured using physician and non-physician survey estimates of hours worked (from the Current Population Survey) along with deflated measures of intermediate input and capital expenses. Fisher found that productivity in physicians' offices grew about two-thirds the rate of that in the non-farm sector between 1983 and 2004. Over the period of the fee schedule, however, the relative growth rates were quite variable. In the 1990s, Fisher found that productivity actually declined, possibly due to managed care restraints on access and use of physician services. After 1999, physician productivity gains were positive but still lagged behind the non-farm productivity index.

Newhouse and Sinaiko (2006) critiqued Fisher (2006) at the same CMS conference. They began by noting some more general problems with CMS' approach to accounting for productivity change in the fee schedule. First, no adjustment is made for the increasing quality

of care provided. Second, reliance on competitive pricing in markets is inconsistent with CMS' use of administered prices under the Sustainable Growth Rate legislation. Third, the number of new service codes continues to increase which raises problems due to changes in technology and the way care is delivered. On a technical level, using physician incomes as an output measure includes intermediate practice expenses and is not strictly limited to the valued added of physicians and their staff. Income also includes a return on physician equity and not solely labor. Income (revenues) must be deflated by a price index to derive total output but actual transaction prices, i.e., what physicians were actually paid, as opposed to list prices, had to be imputed. Fisher did this by using a non-linear forecast of the relation between Medicare and private payments in 1975 trended forward two decades. This method of imputing transaction prices needed to deflate revenues to output is questionable for complex reasons cited by Newhouse and Sinaiko (2006). The authors note that MedPAC's (2004) alternative trend for transaction prices was only 2.3% from 1985-1997 versus 3.3% for Fisher. Overstated real price trends would understate output growth that, in turn, would understate physician productivity gains rather substantially. A problem with Fisher's measure of hours is that it relied on AMA surveys of office-based physicians without allowance for hours of hospital-based physicians. Ultimately, Newhouse and Sinaiko (2006) doubted "that [Fisher's] estimates [were] robust enough to use in the update formula and believe[d] continued use of [the] private, non-farm business MFP [was] a reasonable choice."

We note that no discussion at the conference was devoted to the likely possibility of radically different rates of productivity growth enjoyed by different specialties. A national MFP is a blunt approach to productivity adjustments—particularly within an industry as varied as physician services. As we show later in our report, the sizable increases that CMS has allowed in physician work effort across a wide range of surgical and diagnostic procedures and visits suggest major increases in physician input per unit of output, i.e., declining productivity. On the other hand, large increases in total services to Medicare patients suggests greater and greater physician output and possibly rising productivity. The rest of this report addresses some of the evidence on productivity changes at the more micro-level of individual specialties and services.

2.2.2 Six Drivers of Productivity Gains & Losses

Economists have a specific definition of productivity. It is the ratio of outputs to inputs, or output per unit input. Efficiency and productivity go hand-in-hand as more efficient organizations or individuals produce more output per unit input. A few points are relevant to our evaluation of physician productivity. First, output has both a quantitative (e.g., visits per hour) and a qualitative (e.g., improvement in health per visit) dimension. Raw counts of patients, scans, and visits fully capture output increases only if quality of output is held constant. Also, output can increase without increases in raw counts of services if quality is increasing (e.g., physician diagnosis is becoming more accurate). Second, inputs include more than just physicians. Medical care today is very much a team effort. Less physician time with a patient does not necessarily mean less total clinical time with a patient if greater delegation is occurring between physicians and other personnel or technology is more prevalent. It is possible for physician productivity to be rising while overall productivity is falling depending upon the role of other inputs in caring for patients.

The way in which Medicare's Resource-Based Relative Value Scale (RBRVS) system was designed is responsive to some of the issues surrounding physician productivity. First, it is physician-based in the sense that physicians bill for both their services and staff that work directly for them. The fee schedule pays for these services in three parts: 1) physician work RVUs; 2) practice expense; and 3) malpractice RVUs. Physician work RVUs, the focus of our study, represents a narrower concept of productivity called (physician) labor productivity to distinguish it from total factor productivity that would include other practice inputs. When physicians see more patients per hour, the payment system rewards them directly through their own RVUs as well as indirectly by paying for practice expense RVUs for staff they may be employing. Second, the fee schedule is highly fractionated with thousands of billing codes. These codes are designed to reflect differences in both patient severity and service complexity (e.g., a two-versus one-graft bypass). This is a great strength of the system. When physicians see more complex patients, they are paid more assuming their inputs (work RVUs) have increased.

The RBRVS system has a few drawbacks, however, for accurately reflecting productivity changes. First, if physicians delegate a part of the service to other physicians who are also paid by Medicare, then "double billing" might be a problem. One physician's productivity would increase but fees may not decline in recognition of other physicians' involvement in the case. Second, RBRVS does not consider physician time in travel. If care patterns have changed that involve more or less physician travel, the RBRVS system does not capture the productivity changes involved.

We have identified six sources of productivity gains (or losses) in physician work across four broad categories of services. Four enhance productivity while two decrease productivity. They are the following:

Productivity-enhancing Sources

1. **Technology Substitution**. As in other industries, physicians have benefited greatly from new equipment (e.g., computers, imagers). These technologies increase physician quality-adjusted output per hour of input.

2. **Personnel Substitution**. Physicians have formed larger and larger groups over time which has allowed them to rely more on allied health personnel. Consequently, they have been able to delegate more and more patient and administrative activities to nurses, technicians, office personnel, and others.

3. **Learning-by-Experience**. As in most other industries, physicians become quicker and more accurate as they gain experience in working with new equipment, attempting new surgeries, and in diagnosing unfamiliar illnesses.

4. **Re-engineering Services**. The patterns of care has changed markedly over time in terms of hospital stays, delegation to specialists, new sites of care, the role of medications, and treatment protocols in general. Many of these changes have made individual physicians more productive per hour worked.

Productivity-decreasing Sources

5. **Greater Documentation**. Greater documentation to assure quality, avoid fraud and abuse claims, and to expedite billing has added to physicians' direct patient care time and reduced their productivity in diagnosing and treating patients.

6. **Patient Severity**. Secular increases in patient severity due to the aging of the population, more chronic illnesses, advanced surgical techniques on comorbidly ill patients, and the like have also reduced physician output per hour worked. However, the increase in severity of illness may be offset, at least partly, by the use of higher level codes that are applicable when higher levels of work are documented (e.g., the higher level E/M codes associated with higher levels of history, examination and medical decision making required for the care of such patients).

Because CMS and the RUC in their physician work updates have tended to emphasize the two sources of productivity decrease, we concentrate on the sources of productivity increase and where they might be most prominent.

2.2.3 Productivity Gains by Service Category

Table 2-1 identifies several service groupings in the literature that have been affected by one or more of the four drivers of productivity gain. The Xs in the table indicate the primary sources of productivity gain for a service. Technology substitution is widespread in medicine as new, computerized equipment makes surgery and diagnostic testing less burdensome to physicians. Not only do these technologies greatly reduce physician time performing surgeries and interpreting tests, they are subject to a learning curve that further reduces work effort. Other changes involve a substitution of allied health personnel responsible for subtasks within a procedure or visit. Finally, shifts in site of care, shorter inpatient stays, and specialist-to-specialist hand-offs "re-engineer" the service in still other ways that reduce work effort for any one physician.

For example, diagnostic and therapeutic endoscopic technologies have significantly reduced the work effort of specialists and surgeons. While use of these technologies requires up-front training, they are subject to a steep learning curve and shorter physician times with experience. The same is true of most other services listed in Table 2-1. Computerization has permitted continual substitution of technicians for physicians in the diagnostic labs and clinics. Even major surgical procedures have involved greater use of advanced practice nurses and other support personnel in the operating room who take over time-consuming sub-tasks (e.g., harvesting veins for bypass surgery). Personnel substitution has also been increasingly common among E&M visits as the different sub-components of the visit are subdivided and given to nurse practitioners (e.g., taking vital signs, recording prior conditions).

Many of these gains are associated with increases in practice expense (e.g., the adoption of electronic health record systems and other new technology), additional salaried ancillary personnel, new surgical technology (when purchased by the physician's practice as opposed to a facility). A fair assessment of such gains in productivity (with resultant decreases in physician work) must take into account concomitant increases in practice expenses.

Table 2-1
Physician Services Impacted by Four Productivity Drivers

	Technology Substitution[a]	Learning by Doing[b]	Personnel Substitution[c]	Reengineering[d]
Endoscopic procedures	X	X		
Laser procedures				
Dermatology	X	X		
Ophthalmology	X	X		
Computerized diagnostic testing[e]	X	X	X	X
Bone density imaging (DEXA)	X			
Digital radiology	X			
Surgical Procedures				
Major (e.g., open heart)	X	X	X	X
Minor surgery (e.g. dermatologic)	X	X		X
E&M visits				
Preventative			X	
Consultations	X	X	X	
Inpatient	X		X	X

NOTES:

[a] Technology saves physician time performing and interpreting procedures.

[b] Physician time and work effort declines with familiarity with technology.

[c] Physicians delegate more tasks in service to allied health personnel.

[d] Shorter inpatient stays, shifts in site of care reduce physician total time and work effort.

[e] ECG, spirometry, EEG, evoked potentials, nerve conduction, audiometry, visual fields, ultrasound diagnosis, sleep studies.

2.2.4 Productivity Gains by Specialty

Table 2-2 highlights the specialties most affected by the four productivity drivers. Practically all of the specialties have been aided by technical change that has made their work easier in one respect or another. To take one example, ophthalmologic lasers have greatly reduced procedure work effort and allow hand-offs to non-surgeons for follow-up care currently included in an unchanged post-surgery global bundled payment. Thoracic and other surgeons are increasingly handing off their patients to in-hospital intensivists, also reducing their post-surgery work. Radiologists now receive digital images and films over the internet with greatly enhanced visual technologies. Not only can images be interpreted faster with less error, they can be done from the comfort of home without time-consuming travel to and from the hospital. Over time, specialists have also become quicker at making consultations, especially when aided by computerized diagnostic tests and substitution of technicians and other allied health practitioners.

Table 2-2
Physician Specialties and Four Productivity Drivers

	Technology Substitution	Learning by Doing	Personnel Substitution	Re-Engineering
Allergy/Immunology	Blood testing v. skin testing	Shorter consults	Technicians, NPs, PAs	
Anesthesiology	Enhanced monitoring		Nurse anesthetists	
Cardiology	Computerized non-invasive testing and diagnosis Cardiac imaging	Invasive cardiology Shorter consults	Technicians, PAs, NPs	
Dermatology	Laser, cryo-chemosurgery	New dermatologic surgery		
Emergency Medicine			RNs, PAs and NPs	
Family Practice		Shorter visits	PAs, NPs	
Gastroenterology	New endoscopic and video procedures	Shorter consults	PAs, NPs	
General Surgery	Surgical procedures changed from open to minimally invasive	Shorter operative times Shorter consults	PAs, NPs	Migration to surgicente Reduction of LOS
Hematol/Oncology	Advanced infusion technology		PAs, NPs	
Internal Medicine		Shorter visits	PAs, NPs	
Nephrology		Shorter consults	PAs and NPs (dialysis)	
Neurology	Computerized dx testing e.g., EEG, evoked potential	Shorter consults	Technicians	
Neurosurgery	Microsurgical procedures			
Nuclear Medicine	Bone density (DEXA)			
Obstetrics/Gyn	Minimally invasive surgery	Shorter operative times		

(continued)

Table 2-2 (continued)
Physician Specialties and Four Productivity Drivers

	Technology Substitution	Learning by Doing	Personnel Substitution	Re-Engineering
Ophthalmology	Laser procedures	Laser procedures	Technicians	Handoff to nonsurgeons
Orthopedics	Minimally invasive surgery	Shorter consults & OR times		
Otolaryngology	Minimally invasive surgery	Shorter consults & OR times	Technicians	
Pathology	Automated testing & interpretation			Outsourcing tests
Pulmonology	Spirometry	Shorter consults		
Radiology	Digital radiology, teleradiology	Digital radiology	Technicians	Subspecialization
	electronic display vs film			Teleradiology outsourcing
Thoracic/CVSurgery	Minimally invasive surgery	Shorter operative times Minimally invasive surgery	Technicians, PAs	Handoff to intensivists
Urology	New endoscopic procedures	New endoscopic procedures		

2.3 Expert Physician Panel on Physician Productivity Gains

2.3.1 Overview of Panel Agenda & Activities

On March 3, 2006, RTI staff conducted an all-day meeting in RTI's Washington, D.C., offices. Seven physicians formed the expert panel with backgrounds in Cardiology, Internal Medicine, Family Practice, General Surgery, Cardiovascular Surgery, Gastroenterology, and Radiology

- Bill Coleman, M.D., Ph.D., (Family Practice) Director, Office of Family Heath, Education, and Research, University of Alabama School of Medicine
- Michael Crittenden, M.D., (Cardiovascular Surgeon), Veterans Administration, West Roxbury, Massachusetts
- Bruce Greenwald, M.D., (Gastroenterology) Associate Professor of Medicine, GI Division University of Maryland School of Medicine
- Marcia Javitt, M.D., (Radiology) Section Head, Body MRI & Genitourinary Radiology, Walter Reed Army Medical Center, Washington, DC
- Michael Miller, M.D., Ph.D., (Internal Medicine) Chief Medical Officer, VA New England Healthcare System
- Ferdinand Venditti, M.D., (Cardiology) Chair of the Department of Medicine, Albany Medical College
- Louis Wilson, M.D., (General Surgeon) Private Practice

To introduce panelists to the work of the panel and to stimulate discussion, we illustrated the panel's task of identifying services that have undergone increases in efficiency using three case reports: (1) office practice using physician extenders, (2) electrocardiography; and (3) open versus laparoscopic cholecystectomy (see ***Appendix 2A***). Next, we presented the panelists with a table showing a matrix of specialties and drivers of increased productivity. Many of the cells were "seeded" with possible productivity drivers to facilitate the discussion. For instance, "shorter surgical times" appeared in the cell for general surgery and learning by doing. "Tele-radiology, outsourcing" appeared in diagnostic radiology/re-engineering cell, and "PAs, NPs" were included in the cell for personnel substitution for internal medicine and family practice. After a wide-ranging discussion of issues and services in the morning session, the afternoon session was devoted to more specific types of services and particular procedures that were believed to have undergone significant productivity change—primarily as a result of shorter physician times.

2.3.2 Panelist Difficulties in Measuring & Isolating Trends

Although panelists were selected primarily because they were less dependent on fee-for-service RBRVS-based revenues than most physicians, and, hence, more likely to note

productivity gains, it was surprisingly difficult for them to focus on services with less physician work effort. (Respondents to Specialty surveys likely have even greater difficulties.) Several panelists spoke of increased hours of work and increased workloads. Although some of this was attributed to increased demands for documentation, there was a general perception that they are working longer and perhaps harder, but doing more. Although they all felt physicians were becoming more productive in many ways, they had difficulties reconciling this belief with their working longer hours. We mention a few of their reasons for greater perceived work effort below, but they may have felt that physician income was not keeping pace with their increased output, implying less, not greater, efficiency. Squeezed on insurer fee updates that might not cover all of their rising practice costs or their own cost of living, it was difficult for them to address the question of physician work for a narrowly defined CPT code. Within-code productivity growth is just one facet of a complex and rapidly changing world.

One source of confusion was the constant introduction of new technologies and procedures, each with its natural diffusion and learning patterns. At any one time, panelists, individually, are at different points on their learning curve for many different procedures. It becomes even more difficult when they attempt to summarize productivity gains over many other physicians who also vary in their expertise in using new technologies.

Another source of confusion was more apparent than real and stemmed from the physicians' unfamiliarity with the extreme fragmentation in the CPT coding system. The example was given of stent insertion adding to the time and complexity in performing angioplasty. Physicians on the panel focused on the primary procedure and saw modifications such as inserting stents as "extra work." The CPT payment system, however, is flexible in paying more for extra work. In the last few years, an additional code allows cardiologists to record and receive extra payment for every additional stent they insert. Our interest, of course, is in physician productivity gains in performing angioplasty with versus without inserting stents.

Ambiguity over the scope of output confused panelists from time to time. One panelist argued for a more standardized definition of productivity. The example he gave was the problem of defining an "active patient" in a physician's VA caseload. Given the fractionated nature of CPT-based payment, our study's definition of output is grounded in the individual procedure code. This is not the way clinicians naturally think of "output." The concept of output depends to some extent upon specialty. For radiologists, interpreting images is most common and closely approximates our definition of output as well. Family practitioners, at the other extreme, think more in terms of patients and managing their acute and chronic illnesses. The "healthy patient" to them is what they produce—although they do so primarily through individual office visits.

Further complicating the definition of output are considerations of quality, captured by morbidity and mortality. It was difficult for panelists to think solely in terms of inputs, as does the Medicare Fee Schedule–when commenting on possible productivity gains. Physicians argue that gains are understated due to quality improvements and that the payment system ought to reflect this source of productivity increase when input reductions occur.

Telemedicine raises different problems in applying productivity gains to fee schedule corrections. An obvious gain to "remote off-site diagnosis," increasingly taking place in radiology and even on hospital floors, is the reduction in physician travel time. Physician travel

time is a real cost that was never captured in the resource-based methodology, and fees are not currently adjusted when performed on a remote basis.

2.3.3 Forces Increasing Physician Productivity

Panelists did acknowledge the learning curve associated with new technologies. Experience and increased volumes lead to quicker performance and fewer adverse outcomes. Panelists also emphasized that continual enhancements in new technologies also raises physician productivity. Better imaging, more flexible and smaller diameter catheters, for example, reduce procedure times and physician risk and stress. Panelists also noted the positive role of more physician extenders, more exam rooms, and more hospital residents in raising physician productivity. More "hand-offs" from surgeons to intensivists on hospital floors were thought to raise surgeon productivity. This would occur through fewer post-operative inpatient visits by surgeons, if not other physicians.[6] Aging of the stock of physicians was also mentioned as another potential productivity driver—again, the impact of greater experience.

2.3.4 Forces Reducing Physician Productivity

As noted above, panelists mentioned several factors that required more physician time and effort performing a procedure or service. These included the "options effect" that logically requires more pre-service work-up time. New devices and drugs generate more options for diagnosis and treatment resulting in more medical decision-making prior to care. A multitude of different beta blockers or multiple images make decision-making more complex and require more discussion with patients. This would manifest itself in more extensive pre-service work-ups. Multiple images are a subset of "options effect," and one panelist raised the notion of "satisfaction of search." Given the proliferation of images available to the clinician, physicians must decide when they are satisfied with their diagnosis and when further imaging is not cost effective.[7]

Conflicting viewpoints were offered regarding productivity effects of the electronic medical record (EMR). More than one panelist believed the EMR could reduce physician productivity—at least in a crude, unadjusted, sense. First, the EMR produced more "alerts" during the patient visit. These required more physician time prior to and during the visit, thereby adding to total visit time. Alerts may also produce false positives that could require more post-visit follow-up. The EMR can also include numerous images that take more time to review. Finally, the EMR can involve significant physician time typing in text rather than dictating notes. Panelists, nevertheless, recognized the gains to the EMR by reducing the time to review the patient's history and tests prior to the visit. One panelist stated his opinion that many physicians cannot invest the time (and resources) to learn how to use the EMR. It may be that the EMR, at

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[6] Substitution of physician intensivists for surgeons differs in key ways from other ancillary personnel who might be employed in the physician's practice. Intensivists would bill insurers separately while support personnel costs would be reflected in Medicare only through higher practice expenses. Unless output is fully adjusted for patient severity and better outcomes, "hand-offs" to intensivists would bias total labor productivity downwards.

[7] An interesting research study might be how to determine the optimal, efficient, approach to sifting through tests and images to find true positives and negatives.

this point in its evolution, may improve quality more than efficiency, a gain not recognized in the fee schedule.

2.4 Brief Literature Review

2.4.1 Learning by Experience

The literature specifically on physician experience with new technologies is not extensive. One article summarizes the learning curve of 23 residents performing 278 tension-free vaginal tape procedures (McLennan and Melick, 2005). The perforation injury rate was 41% for the first five cases, 31% for cases 6–10, and 26% for cases 11–15. Another study involved two experienced pacemaker implanters and their learning by experience in extracting leads using lasers (Ghosh *et al.*, 2005). The overall success rate was 95% on 75 patients in the first third of cases and 100% success in the last third. Fluoroscopy time was 19 minutes in the first third of cases, 11 minutes in the second third, and eight minutes in the last third of cases, indicating greater speed with greater success. Moore and Bennett (1995) report the learning of surgeons performing laparoscopic cholecystectomy on 8,839 patients in the early 1990s. The injury rate was 1.7% on the first case but fell tenfold to .17% by the fiftieth case. Learning was most prominent through the first 20 cases with slow improvements thereafter. The authors also cite the negative association found between surgical volume and injury or death found in studies of open cholecystectomy (Hannan *et al.*, 1989). The authors distinguish between low- and high-threshold learning experiences in different surgeries. Laparoscopic cholecystectomies are considered low-threshold, implying that learning progresses quickly with few procedures. Open heart surgery is one example of a high-threshold procedure where learning continues over a long period of time and procedures (Cromwell, Mitchell, Stason, 1990).

Another example of learning in performing laparoscopic cholecystectomies is provided by Schijven and Jakimowicz (2003). They employed a simulator machine to test 33 residents across 25 simulations each. They found that most subjects gained proficiency at 25 simulated procedures with a substantial decline in surgery times from 150 minutes in the first five procedures to just 100 minutes in the last five surgeries. Mohr, Nadzam, and Curet (2005). studied the learning curve for totally Robotic Roux-en-Y Gastric Bypass compared with gastric bypass without using robots. The general learning curve for general gastric surgery is 75–100 cases (Schauer *et al.*, 2003; Oliak *et al.*, 2003). Comparing ten cases with and without the robot, median surgery times were 169 and 208 minutes, respectively. Without the robot, surgery time on the first case was 5.8 minutes per BMI (body mass index point) versus 3.5 minutes per BMI on the tenth case. Using the robot, the first case took 5.2 minutes per BMI versus 2.9 minutes per BMI on the tenth case. In addition, the entire surgery team took 32 cases to reach the average 2.5 hours without the robot.

2.4.2 Internet and Telemedicine

Use of the internet for medical purposes has been growing at an accelerated pace with great potential for gains in physician productivity. The following are a few examples. Two major uses of the internet have been for physician-to-patient and physician-to-physician communication. Liederman *et al.* (2005) conducted a study of 16 primary care offices connected with a major teaching hospital in California. Web-based messaging was used between practitioners for problem-specific consults, script refills, appointment requests, test results, and

other communications. Intervention primary care physicians saw 11% more patients per day versus a control group and provided 10% more RVUs per day not using the messaging system. Telemedicine growth and feasibility was discussed by Wachter (2006) for remote interpretation of radiological scans. Because CMS prohibits payments to providers outside the U.S., preliminary reports are filed by radiologists working in India and other countries with hospitals in the U.S. The next day, hospital radiologists "review the interpretation" and submit a final primary report to CMS and other payors. Concerns over "ghost-read" scans are rising, in part because U.S. radiologists are spending far less time reviewing scans before billing. Telemedicine may be progressing even further through ICU off-shore programs for critical care intensivists (Breslow, 2004).

2.4.3 Office Practice Organization and Staff Delegation

It has been asserted that office-based physicians have limited opportunities to increase productivity because they need to spend so much time face-to-face with patients to provide high quality care. McCarthy (2002) lists at least 15 ways that an office practice can improve productivity, including appointment scheduling, pharmacy refills, specialist referrals, exam results, and even office layout. In addition, Grzybicki *et al.* (2002) demonstrated the benefit to family physicians of employing physician assistants (PAs). Delegation of many tasks to PAs can greatly increase visits with a compensation-to-billing ratio of only 36%. Rodyskill (2003) also conducted a study of task delegation to physician extenders (PEs) at the Mayo Clinic. A PE supported four general internists compared with four internists without PE support. The PE reduced physician indirect patient care time (e.g., telephone calls, ordering tests, appointment triage) by one hour per day per physician. RVU-based output increased 41% compared with physicians without PE support. There was no difference in patients' reported satisfaction with care.

2.5 Types of Services With (Possible) Productivity Gains

2.5.1 Computerized Diagnostic Testing

The code for electrocardiogram report, 93010, was the most frequently billed procedure to Medicare in 1998, and a complete electrocardiogram, 93000, was the sixth most frequent. The two codes accounted for approximately $448 million in allowed Medicare charges. The cardiologist on the panel expressed agreement with the case report on increased productivity of interpreting electrocardiograms that had been included in materials for the panel (see Appendix 2A). He emphasized the increased efficiency in the physician's analysis of the 12-lead electrocardiogram. Electrocardiograms are produced and interpreted much more rapidly than was the case 15 years ago. Moreover, physician work involved in CPT 93000 was alleged to be even less than a quarter of the work of the history, examination, and medical decision making of a level 3 office visit (99213), as the current ratio of work RVUs of these services would imply. The panelist believed EKG physician times had declined by 50% compared with Harvard baseline times. Computerization also shortened cardiac testing using Holter monitors and stress tests. Pulmonological spirometry had become highly computerized, thereby involving less physician time and stress. Computerization in many fields had also allowed the actual testing to be delegated to technicians, further reducing physician input.

Finally, panelists believed that many laboratory tests seemed overvalued. Work RVUs for Tissue Exams, 88331/2, the top two Medicare outlays to pathologists in 1998, were 0.75, which seemed high given computerized interpretation of results. (For reference, an intermediate office visit for an established patient had 0.67 work RVUs with guideline face-to-face times with patients of 15 minutes. By 2006, 99213 work RVUs were higher than 88331/2.)

A diagnostic procedure thought to be undervalued by the panelists was mammography (76090/1) at 0.69 work RVUs—the equivalent (prior to 2006) of an established intermediate office visit of 15 minutes. Such procedures were considered quite difficult to interpret and involved considerable medical and financial risk to the physician if a true positive is missed.

2.5.2 Diagnostic Endoscopy & Catheterization

According to the gastroenterologist on the panel, routine diagnostic colonoscopies were being performed in 15–20 minutes with two procedures scheduled per hour. Practitioners are better trained, more familiar with the procedure, the equipment has improved, and sedation is shorter and more efficient than previously. Therefore, the work RVUs for this procedure are likely outdated and overvalued.[8] Esophagus endoscopy, 43200, was also overvalued at 1.59 work RVUs because it did not involve two-thirds the work of an upper GI endoscopy. Direct diagnostic laryngoscopy (31525), performed mainly by otolaryngologists, also was also perceived to be overvalued at 2.63 work RVUs relative to other similar procedures.

Left-heart catheterization, 93510, accounted for the fourth most Medicare payments to cardiologists in 1998. The code was rated 4.33 work RVUs; the equivalent of 6.5 intermediate established office visits of 15 minutes each in 1998. The panel cardiologist asserted that diagnostic catheterizations were taking only 60 minutes today, down from 90 minutes a few years ago. The learning curve, improvements in the technology (e.g., smaller catheter diameters), and better contrast agents all played a part in improved physician productivity.

2.5.3 Inpatient Surgery

According to panelists, pacemaker implants (33200 series) were believed to be easier and less time-consuming than in1998. Miniaturization has made the procedure quicker and less surgical work and stress. Minimally invasive disk surgery was replacing laminectomy and involved considerably less work. A new CPT code (62287) has been added, recently, for percutaneous diskectomy. Since this is a relatively new procedure still undergoing diffusion in clinical practice, this is a good example of a class of procedures deserving careful study to determine the degree of productivity increase gained by physicians negotiating a learning curve. Radical prostate surgery using robots (55845) and laparoscopic nephrectomy are subject to a learning curve with declines in work effort. Dilation and Curettage (D&C) procedures (58120) were considered overvalued by the panel at 3.27 RVUs, which was nearly 5-times established intermediate office visit RVUs in 1998. Minimally invasive aortic valve replacements are a new

[8] An interesting comment made about diagnostic endoscopy was what might be called the "definitive diagnosis syndrome." More and more, it was claimed, physicians are referring patients for endoscopic tests to produce a "definitive" diagnosis. (DNA testing affords a similar example.) Once the improved technology is available, then physicians would be remiss in not ordering such a test, even when they are quite confident of their diagnosis.

procedure that should be subject to the learning curve as well as shortening operating room times relative to open procedures.

2.5.4 Office/Outpatient-based Surgery

Code 17003 for "destruction of 2-14 lesions" was the fourth most common procedure billed to Medicare in 1998, accounting for $85 million of allowed charges plus an additional $95 million for destroying the first lesion (code 17000). A panelist who performs dermatologic surgery described the ease of performing "destruction of lesions" (usually benign actinic keratoses) with current technology, as well as the ease and safety of the procedure. The physician often treats a large number of benign skin lesions at one time with rapid application of liquid nitrogen. The RVUs in 1998 for performing this procedure consist of 0.60 for the first lesion then 0.15 extra for each additional lesion. The total RVUs for destroying multiple lesions do not appear to bear a reasonable relationship to the work involved. It was also alleged that some physicians were splitting destruction across two patient visits to bill the higher code 17000 twice.

Shaved skin lesions were also believed to be overvalued. These procedures (11300-11313) involved cutting off lesions without penetrating the actual dermis, or skin.[9] Nine of the 13 codes appeared in the dermatologist's top 50 Medicare procedures for approximately $28 million in payments. Work RVUs in 1998 ranged from 0.67 to 1.20--each code equal or above the RVUs for an established intermediate office visit in 1998.

Cataract removal and lens implantation (66984) accounted for $1.1 billion in Medicare outlays in 1998 with 10.28 work RVUs (the equivalent of 15 established intermediate office visits of 15 minutes each). Laser eye surgery was considered overvalued by panelists for several reasons. First, ophthalmologists were now using vapor emulsification that simplified the procedure. Second, optometrists were substituting more often for the surgeon in the patient's follow-up care—especially with the growth in "eye clinics" and longer patient travel times. The CPT coding modifiers allow for separate physician billing of pre/intra/post-operative care. Third, the implicit work per unit time ratios (WPUT) for eye procedures appeared to be inconsistent with most other surgical procedures.

2.6 Panelists' and RTI Recommendations/Observations

Panelists had several suggestions for policy and future research besides special studies of codes they believed to be overvalued.

2.6.1 Continuous Evaluation of Work Effort Changes

First, they argued in favor of on-going, continual annual evaluation of changes in physician work effort. Consensus was that the task of maintaining accurate measures of work effort was not possible once every five years given the proliferation in codes, new technologies, and changes in practice patterns. It is RTI's belief that the immense scope of continual updating effort across so many services is a major undertaking that will require significant resources—

[9] There are also 18 different codes for excising ("cutting out entirely) benign lesions. They differ by body part and by size of lesion—all with different RVUs.

intellectual and financial—and a public commitment over an extended period of years. Objective data and quantitative methods are required. New methods will need to be developed and validated to address some of the very technical problems (e.g., objective physician ratings of work effort, office visit times). The locus of such studies should be in a disinterested, neutral organization, group, or institution that balances both public and private provider and payer interests. Specialty society sponsorship is inappropriate, although specialty society participation is desirable.

2.6.2 Periodic Re-evaluation of Multiple Points of Comparison

Based on our analyses in Section 6.3 below, it is crucial that the Multiple Points of Comparison be re-evaluated in a special study. These codes provide the inter-specialty links assuring equity and efficiency across widely disparate services. These links, RTI believes, are rapidly losing their meaning due to CMS' common enforcement of within-family budget neutrality. Within-specialty or within-family-of-service budget neutrality is no longer required or desirable. Savings attributable to increased productivity in specific services, families of service, or larger categories must be made available to the full range of Medicare services. Linking codes should not be manipulated in a way that loses the inter-specialty integrity in relative work effort.

2.6.3 Increasing "Hands-offs" by Surgeons

Panelist concerns about the growing fractionation of the post-operative care of surgical patients suggests a study of the extent to which the clinical model of a global surgical service provided by the principal surgeon has been replaced by a variety of alternative "hand-off" models. The dissolution of the global surgery model presents special problems given the way in which the RUC now collects and presents physician ratings of total work. The methods used in the original Harvard studies of surgical procedures allowed for great flexibility in how the data could be used by estimating the work and time of nine separate components of the global service (Hsiao W.C., *et al.*, 1992). Data currently provided to CMS by the AMA RUC committee present only the total work of surgical procedures. Our understanding is that the RUC does not require reporting of work effort separately, but only times for the operative procedure and the pre/post-surgery components of global services. It is not clear how CMS can accurately pay physicians who provide only the operative procedure and transfer patients for post-operative care to others. The absence of disaggregated information may lend itself to overpayment if inappropriate global payments are made to surgeons as well as to specialists and others who now provide components of services previously included in the global package. It would be critical that the various components of global services be reported separately given the hand-offs increasingly taking place after the operation.

2.6.4 Changing Work Effort for Office-based Surgery

A study is required of the times and work effort involved in a number of office-based surgeries such as lesion destruction. RTI's previous analyses of office E&M visit services (Cromwell et al., 2006) are updated in Section 3, but we are not able to analyze office-based surgical services because only the physician's face-to-face time with the patient is recorded on another objective survey (NAMCS) and these visits include non-surgery time with the physician. Therefore, we would understate any pre/post-surgery follow-up time. We also would have difficulty separating out other services and work effort occurring during the same visit.

2.6.5 Calibrating Work Effort for Diagnostic Procedures

A companion study is needed of procedures such as diagnostic endoscopies, angiography, echocardiography, radiology, and other lab procedures. In Section 4, we re-analyze operating room times using log data, but no similar database exists for non-operating room procedures.

2.6.6 Need for Work-per-Unit Time (WPUT) Studies

Our panelists' concern about eye surgery RVUs calls for a study of work per unit time differences across families of codes. The original Harvard studies showed that the mean work per unit time of hundreds of surgical and diagnostic procedure services ranged between 2 to 2.5 times the mean, WPUT, of evaluation and management services, including visits performed by surgeons themselves. Yet, some services exhibit WPUT values four to five times the mean for E/M services. Given the possibility that the subjective times obtained in Harvard's study may overstate the times for these services, we recommend that the work per unit time for surgical services be calculated, and that procedures exceeding some reasonable threshold of intensity (i.e., WPUT) be designated as possibly misvalued and carefully studied. One method of evaluating these services would compare their work with the work of benchmark surgical procedures validated by a set of surgical experts. A reasonable policy rule might be that no service have a WPUT value above a certain threshold.

2.6.7 Revaluing Work Effort of "Marginal" CPT Codes

A study similar in spirit to WPUT would be a focused analysis of the "marginal" CPT codes that differentiate payment either by the number of extra tasks conducted during a procedure (e.g., destroyed lesions, stents inserted) or by the scope of the problem (e.g., diameter of lesion excised, diameter of skin graft). To our knowledge, work effort for such codes is not considered under CMS' usual review process. One interesting simulation might be the imputed hourly "wage rate" to dermatologists from seeing patients with several lesions to be excised or destroyed.

SECTION 3
A COMPARISON OF PHYSICIAN CPT GUIDELINE VISIT LENGTHS WITH THE NATIONAL AMBULATORY CARE SURVEY (NAMCS)

3.1 Introduction & Methods

3.1.1 Background on Calibrating E&M Work Effort

In January, 1992, CMS implemented a new Medicare Fee Schedule (MFS) for physicians that was based, in large part, on physician surveys of the amount of work involved in providing thousands of different services. The time physicians spend with patients comprised the largest portion of the work effort and, hence, plays a major role in the payment differentials (i.e., RVUs) across billing codes. Temporal changes in the amount of time physicians spend with patients can invalidate the relative work effort involved and require recalibration of the physician work component of the MFS. CMS is required by Congress to revalidate the work component every five years for as many CPT billing codes as necessary.

Besides serving as the foundation for the physician work component of the MFS, face-to-face times also play a key role in allocating physician practice expenses. In June, 1998, CMS (Federal Register, 1998) published a final rule for determining the nonphysician component of Medicare payments. Practice expense pools were determined by specialty before being put on an hourly basis using AMA reported physician work hours. Finally, expenses were assigned to specific services using the total hours implied by time estimates developed earlier by Harvard and AMA/RUC staffs multiplied by CPT service frequencies.

This chapter provides a preliminary validation of the physician intra-service times for 15 Evaluation and Management (E&M) CPT codes that appear in the CPT coding manual:

New Patients

- 99201 Office or other outpatient visit with focused history and examination and straightforward medical decision making; typically 10 minutes
- 99202 Office or other outpatient visit with expanded focused history and examination and straightforward medical decision making; typically 20 minutes
- 99203 Office or other outpatient visit with detailed history and examination and low complexity medical decision making; typically 30 minutes
- 99204 Office or other outpatient visit with comprehensive history and examination and moderate complexity medical decision making; typically 45 minutes
- 99205 Office or other outpatient visit with comprehensive history and examination and high complexity medical decision making; typically 60 minutes

Established Patients

- 99211 Office or other outpatient visit with minimal presenting problems that may not require the presence of a physician; typically 5 minutes

- 99212 Office or other outpatient visit with focused history and examination and straightforward medical decision making; typically 10 minutes

- 99213 Office or other outpatient visit with expanded focused history and examination and low medical complexity medical decision making; typically 15 minutes

- 99214 Office or other outpatient visit with detailed history and examination and moderate complexity medical decision making; typically 25 minutes

- 99215 Office or other outpatient visit with comprehensive history and examination and high complexity medical decision making; typically 40 minutes

Consultations: New and Established Patients

- 99241 Office consultation with focused history and examination and straightforward medical decision making; typically 15 minutes

- 99242 Office consultation with expanded history and examination and straightforward medical decision making; typically 30 minutes

- 99243 Office consultation with detailed history and examination and low complexity medical decision making; typically 40 minutes

- 99244 Office consultation with comprehensive history and examination and moderate complexity medical decision making; typically 60 minutes

- 99245 Office consultation with comprehensive focused history and examination and high complexity medical decision making; typically 80 minutes

The 15 E&M office codes represent $2.7 billion in Medicare expenditures to physicians over a 2-year period, 2002-2003 (see Table 3-5). They also play an important role in allocating office practice expenses. Moreover, several E&M codes anchor, or link, the relative values and work effort of many other CPT codes used by Medicare in paying physicians.

Before highlighting our validation strategy, we first summarize how CMS developed, then implemented, the MFS. We offer three reasons why times may no longer be accurate measures of physician direct involvement with patients, followed by the challenges to validating the E&M codes. This leads to a preliminary discussion of the "validation data set;" namely, the National Ambulatory Medical Care Survey (NAMCS). Finally, in section 3.1.5 we outline the assumptions necessary to conduct a validation exercise using NAMCS data of physician face-to-face times with patients.

Validating the accuracy of CPT guideline E&M times since 1992 cannot be done directly for reasons discussed in Section 3.1.3. Instead, we use the times physicians report on the long-running National Ambulatory Medical Care Survey (NAMCS) of office practices to indirectly validate the times. The comparison of the Medicare CPT guideline times with NAMCS times in this report is presented in five sections. Various subsections of Section 3.1 that follow provide background on the Evaluation & Management (E&M) office visit codes in the Medicare Fee Schedule, present the challenges to validating Medicare guideline times for each type of visit, and outline our evaluation strategy for validating the guideline times using the NAMCS survey. Section 3.2 reviews the data sources and sampling methods. First, the Medicare claims data are discussed, followed by the design, fielding, and *ex post* sampling required in the NAMCS survey. Section 3.3 reports results from indirect validation comparing times for new and established patients subset by specialty. Section 3.4 reports trends in visit times and content from 1992 to 2003 based once more on annual NAMCS data. Trends are shown for both Medicare versus non-Medicare patients. Section 3.5 summarizes findings from the various analyses.

3.1.2 Implementing the Medicare Fee Schedule

When CMS implemented the Medicare Fee Schedule, physicians were provided with definite guidelines when choosing among the E&M codes that range from a brief to a complex visit with either a new or established patient. These guidelines took the form of vignettes in the CPT coding manual, accompanied by an estimate of the expected face-to-face time with patients. Exactly how physicians interpret the guidelines in choosing which codes to bill is unknown, but they are instructed to emphasize various dimensions of visit content (i.e., history taking, examinations, case complexity) and not time spent with patients. Developmental work by Harvard, the AMA, and others produced a close link of physician work effort and visit content with time, however (Braun, Dernberg, Dunn, *et al.*, 1992). Hence, the average time physicians are spending with Medicare patients should conform to the content being delivered.

Three reasons exist for why the intra-service times appearing in the CPT codebook may no longer be accurate. First, *content of visits has changed*. This presents no billing problem if physicians conform their choice of codes to any changes in content. Average times within each code may not have changed, but overall average times would change with the revised mix of shorter and longer CPT codes. Second, times within each code have changed for the same average content level. This could occur if physicians adopt more efficient practice styles, e.g., delegate more tasks to ancillary personnel. Measuring such changes in times is a primary goal of this validation study. Third, physicians may be incorrectly coding some of their visits according to content, resulting in higher (or lower) overall average times spent with patients. Thus, face-to-face times with patients may still be accurate, but the content level within each code is no longer consistent with the guideline times. Over time, any or all three factors may be occurring. The validation task is to separate out the effects of each factor with a particular emphasis on changes in times for a given content level.

3.1.3 Challenges to Validating the E&M Codes

Validating the estimated time involved in individual E&M codes faces three key challenges. First, direct observation of physician times with patients is difficult to do. Very large samples of physicians by specialty would be required. They would have to be randomly distributed by locality, by patient severity, and the like. Observers with stopwatches would have

to sit outside the examining room and monitor the physician's comings and goings. Finally, recorded times would have to be linked to the billing codes by patient.

Second, as challenging as the operational requirements are in conducting direct observation, the Hawthorne Effect is likely overwhelming. Almost certainly, the physician would be aware that an observer was recording face-to-face times. Given heightened concerns over fraud investigations, or even just being "checked on," the physician would be expected to lengthen his/her time with patients to conform to the E&M code that was billed. It would not be surprising to find that times obtained from direct observation would suggest that physicians were under billing the E&M codes.

And third, even indirect validation using another data base is faced with the fundamental fact that physicians do not necessarily follow the guideline face-to-face times in the CPT manual if they are delegating care under their direct medical supervision. That is, physicians often bill codes with longer times regardless of the face-to-face time they actually spend with the patient. This is because CMS' E&M guidelines instruct physicians to choose a billing code primarily on the content and complexity of the visit. This is not an insoluble problem, as discussed next.

3.1.4 The National Ambulatory Medical Care Survey

A second-best solution to direct observation would be a survey of physician times with patients that had nothing to do with reimbursement. Fortunately, the federal government has conducted such a survey for many years. It is called the National Ambulatory Medical Care Survey (NAMCS). Now conducted by the Center for Disease Control (CDC), the survey collects self-reported information on over 20,000 office visits annually including physician face-to-face time (called duration of visit). The survey has many strengths for validating E&M times besides being unrelated to payment. The sample is rigorously drawn to be random nationwide. Payment mode is reported allowing Medicare patients to be isolated for analysis. Extraneous services can be excluded so as to focus only on E&M visits. Only face-to-face time with the physician is reported, symbolized hereafter as length of visit (LOV), although whether the patient also saw other clinicians during the contact is also reported. Whether the patient is new to the practice or established is also reported.

NAMCS has certain limitations, however, that make it less than ideal. First, the times are self-reported, but no strong bias is expected given the rigorous protocol that has been used for over 20 years. Second, no CPT codes are reported on NAMCS. Third, not enough detail is provided on the content of the visit or the patient's condition to classify visits by one of the fifteen E&M office-based CPT codes. RTI staff spent considerable time reviewing the content of the NAMCS reporting form but could not develop rigorous proxies for the key content components defined in the CMS E&M coding guidelines. The coding guidelines emphasize patient history-taking, exams, and patient complexity. NAMCS provides nothing directly on the nature of patient histories. NAMCS does list several different types of clinical exams, e.g., lab tests, x-rays, but does not capture the face-to-face observational component of an exam. CMS defines complexity in terms of number of diagnoses, amount of test taking reviewed, and risk of complications, morbidity, and mortality. While diagnoses are recorded on NAMCS, subjective judgments of risks are not. All of these activities are embedded in the time physicians spend with patients and cannot be retrieved to accurately classify individual visits by CPT E&M code.

3.1.5 A Validation Strategy Using NAMCS

Not having NAMCS times by CPT code makes its use as a benchmark for CPT times more difficult .A form of indirect validation can be performed wherein the average LOV based on NAMCS data can be compared with the average time based on a claims-weighted average of Medicare times for the fifteen E&M codes. If the mix of NAMCS visits is comparable to the Medicare E&M billed claims in terms of patients seen, then no sampling bias contaminates the comparison of mean times. The challenge is one of proper subsampling of the NAMCS contacts to match the expected mix of Medicare E&M patients as closely as possible.

We now summarize our strategy then state the necessary assumptions for making valid comparisons of Medicare CPT times using NAMCS. (***Appendix 3A*** contains a detailed validation strategy using NAMCS.) Our general strategy is the following:

Strategy*: Compare average face-to-face visit times reported in the NAMCS survey to E&M times as a group in the CPT manual. Instead of linking specific NAMCS visits to a set of visits reported in the Medicare claims, we compare the average visit length in NAMCS to the weighted average visit length based on Medicare E&M claims.*

This strategy leads to the following validation test.

Validation Test: $\Sigma_{cpt}\,[f_{cpt,m}\,ALOV_{cpt,\,m}\,] >=< \Sigma_{cpt}\,[f_{cpt,n}\,ALOV_{cpt,n}]$

where Σ_{cpt} = the sum of bracketed variables across a set of CPT codes; $f_{cpt,m}$, $f_{cpt,n}$ = the proportional frequencies of visits in Medicare claims (m) and NAMCS (n), respectively, for a specific CPT E&M code; and $ALOV_{cpt,\,m}$, $ALOV_{cpt,n}$ = the average face-to-face length of visit in the Medicare CPT manual and NAMCS, respectively, for a specific CPT code. The left-hand-side of the test is simply the weighted average physician face-to-face times derived from Medicare E&M claims. The right-hand-side, or comparison group, represents an analogous weighted average time in NAMCS. The frequency of visits by CPT code in NAMCS, $f_{cpt,n}$, is unreported, but with sufficient coding detail, one in theory could assign NAMCS visits to one of the E&M codes. The Medicare frequency of visits by CPT code is directly observable in the claims. However, the true physician face-to-face length of visit is not directly observable in Medicare claims; only the assigned CPT times in the manual are available as weights, which may or may not be accurate as of 2003, the most recent year of NAMCS data.

Based on such a comparison, the following interpretations are possible.

Interpretation #1: If the overall average E&M length of visit using Medicare claims and CPT manual times is equal to the overall average NAMCS length of visit, then the CPT guideline face-to-face times are indirectly validated *as a group*, albeit not individually. If Medicare face-to-face visit times are longer, then actual times with patients, as reported in NAMCS, have fallen since 1992 and the CPT guideline times need to be reduced. If Medicare average times are shorter, then actual times with patients have increased and the CPT guideline times need to be increased.

Interpretation #2: If Medicare overall average E&M visit lengths are longer than NAMCS average times, it is possible that physician time-with-patients has not changed but physicians are not accurately reporting visit content when deciding on which CPT code to bill.

CPT frequency weights in the two data sets must be equal for an unbiased test of average visit lengths. By "equal," it is meant that the visit mix must reflect the same level of visit content in each data set, as proven below. A valid interpretation of the test of average face-to-face times therefore depends upon several key assumptions.

Assumption #1*: The mix of visits in the NAMCS data base corresponds in nature with the mix of visits in the Medicare E&M data base.*

Assumption #2*: The content of the average NAMCS visit is equal to the average content of the E&M visit billed Medicare.*

Assumption #3*: The degree of delegation by physicians to nonphysician providers should be the same, on average, in the final NAMCS and Medicare samples.*

Assumption #4*: In billing E&M codes, physicians accurately report the face-to-face time spent with the patient and the content of the visit.*[10]

Based on these assumptions, the following propositions logically follow.

Proposition #1*: If physicians key solely on visit content in choosing an E&M code to bill, then equal average times between the two data sets imply that the current CPT E&M times are valid.*

Proposition #2*: If physicians key solely and accurately on visit content in choosing an E&M code to bill, and average Medicare face-to-face times exceed NAMCS' average times, then current CPT times (as indicated in NAMCS) are shorter than original estimates (in the CPT manual) and an adjustment in intra-service RVUs is indicated.*

Proposition #3: *If NAMCS times are found to be less than CPT manual times for accurately billed content, then the pool of practice expenses allocated by CMS will be biased towards specialties with the highest proportions of E&M office visits. As an interesting side note, we also present the following proposition.*

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[10] This is a particularly strong assumption given the CMS/OIG audit of Medicare claims. The results, reported in the March 27, 2000 edition of Part B News, indicate significant "incorrect coding" of physician claims. The OIG recommended that CMS "continue to refine Medicare regulations and guidelines to provide the best possible assurance that medical procedures and services are correctly coded and sufficiently documented."

Proposition #4*: If physicians billed E&M codes strictly based on time they spend with patients, and not actual visit content, then NAMCS cannot be used to validate times in the CPT manual.*

This is because Medicare average visit times across CPT codes would change with productivity gains (losses) in the same manner as (the presumed unbiased) NAMCS average times. See Appendix 3A for a discussion of the logic behind each of these propositions.

3.2 Data Sources and Sample Selection

3.2.1 Medicare Data

For the Medicare portion of the analysis, CMS' 1997 and 1998 Procedure Code Utilization by Specialty File was downloaded from the Internet and pooled to create one file. We then received from CMS the 2002 and 2003 Procedure Code Utilization by Specialty Files. These data contain the number of Medicare allowed services performed by specialty for each CPT procedure code. The specialties that were used as part of the analysis were arranged to match the groupings of specialties found in NAMCS. Where Medicare had over 90 different specialties listed, the NAMCS data had specialties grouped into 14 categories. The categories included: general practice, internal medicine, pediatrics, general surgery, OB/GYN, orthopedic surgery, cardiovascular diseases, dermatology, urology, psychiatry, neurology, ophthalmology, otolaryngology and a category of "all other." General practice was defined by NAMCS as including family practice, geriatric medicine and sports medicine. The "all other" category consisted of physicians that could not be classified in the aforementioned categories. The specialties in that category, defined by NAMCS data documentation, were found in the Medicare data and included in the file. Primary care physicians were not included as a separate category in either data set. This category was defined by RTI to include general practitioners, internists, pediatricians and OB/GYNs.

A file was then constructed from the Medicare Specialty Utilization File for the 14 specialties. For this analysis, the Evaluation and Management (E&M) codes for office and outpatient hospital settings—99201-99205 for new patients and 99211-99215 for established patients—were analyzed. It was not possible to treat codes 99241-99245 as a third category of visits. NAMCS does not include a variable that conformed to a strict Medicare definition of a consult. As a proxy for consults, RTI staff utilized the NAMCS referral variable that was phrased, "Was patient referred by another physician or by a health plan for this visit?" Initially, RTI considered this category of visits as "new" patients. Upon further analysis of NAMCS, it was learned that in many instances referred patients were actually established patients (see ***Table 3-1***). NAMCS referrals and Medicare billed office consults were pooled with new and established office visits for comparison of overall visit lengths. When new and established patients were analyzed separately, the five Medicare billed consult volumes were prorated between new and established CPT codes according to the NAMCS percentages shown in Table 3-1. Each NAMCS "referral" visit also distinguished new from established patients. Table 3-1 is for the years 2002 and 2003 combined; a similar table for 1997-1998 may be found in ***Appendix 3B***. (See Section 3.3.3 for discussion of prorating method.)

Table 3-1
Percentage[a] of NAMCS Referred Visits for New Versus Established NAMCS Patients, 2002-2003

Specialty Group	New Patients	Established Patients
Primary care	41.0%	59.0%
Surgical specialties	44.5	55.6
Medical specialties	35.8	64.2
All other	43.4	57.6
Overall	41.6	58.4

NOTE:

[a] Percentages based on frequency of new or established NAMCS patients also reported to have been referred by another physician or health plan.

SOURCE: Developed by RTI staff from analysis of 2002 and 2003 NAMCS.

The number of Medicare allowable services for each specialty for the 10 E&M office visits codes is shown in ***Table 3-2.*** The figures cover two years, 2002 and 2003. (Frequencies for 1997-1998 are in Appendix 3B.) ***Table 3-3*** displays the frequency of Medicare office-based consult codes aggregated for 2002 and 2003. There were 363.9 million billed Medicare office visits to new or established patients in 2002/2003. There were another 21.3 million office-based consults for a total of 384.3 million Medicare visits over two years in the 15 codes. Consult rates vary dramatically by specialty. Surgical specialties billed the most consults with 7.1 million, followed by medical specialties with 4.9 million. However, medical specialties billed the longest consult codes (99244 and 99245) more frequently than the surgical specialties, while the surgical specialties billed the shorter ones more frequently (99242 and 99243).

Table 3-3a prorates Medicare consult visits between new and established patients using the frequencies shown in Table 3-1. The last 5 columns show the percent of visits attributable to a specialty. For example, General Practitioner new+consult visits were 1% of all Medicare visits, their established + consult visits were 24% of all visits, and 25% of all visits overall. General Practitioner new+consult visits were 14% of new visits and 26% of established visits.

Typical times for Medicare allowable services were taken directly from the CPT codebook, shown in ***Table 3-4***.

Table 3-5 presents the differences in frequencies and total charges between 1997-1998 and 2002-2003. Overall, there was an increase of slightly more than 66 million services (or 21%). Most of the increase came from E&M codes 99213 and 99214 (detailed or expanded office visit) with increases of 36.4 million (24% more) and 23.2 million (37% more), respectively. Problem-focused E&M code 99212 exhibited the largest absolute volume decline of 5.1 million visits (5% fewer). Comprehensive new and established patient E&M codes 99205 (11% fewer) and 99215 (5% fewer) also experienced decreases of 431,678 and 541,611 services, respectively.

The increase of 66.1 million office visits over two years added $4.7 billion to total Medicare outlays when valued in current 2002-2003dollars. This understates the cost impact of these additional visits because it ignores concomitant updates to Medicare fees. The volume of

Table 3-2
Frequency of Medicare E&M New and Established Visits by CPT Code and Specialty, 2002 and 2003

	New Patients						Established Patients						
	99201	99202	99203	99204	99205	Total	99211	99212	99213	99214	99215	Total	Overall
Primary care	174,546	1,169,795	2,787,590	2,532,489	1,116,609	7,781,029	9,003,264	19,268,165	120,499,415	49,246,415	7,079,736	205,096,995	212,878,024
General practice	109,781	776,194	1,475,193	933,457	285,709	3,580,334	3,461,885	10,406,731	56,633,778	19,771,739	2,264,931	92,539,064	96,119,398
Internal medicine	48,449	312,336	1,050,807	1,312,535	720,307	3,444,434	5,310,071	7,806,304	61,416,626	27,766,764	4,373,981	106,673,746	110,118,180
Pediatrics	1,530	8,494	19,908	14,051	7,443	51,426	28,746	76,265	328,422	147,196	25,583	606,212	657,638
OB/GYN	14,786	72,771	241,682	272,446	103,150	704,835	202,562	978,865	2,120,589	1,560,716	415,241	5,277,973	5,982,808
Surgical specialties	209,002	1,098,543	2,772,526	1,136,539	233,867	5,450,477	1,198,364	11,409,024	21,290,868	5,762,300	702,266	40,362,822	45,813,299
General surgery	80,542	213,108	322,442	192,632	57,660	866,384	304,153	2,323,106	3,282,708	1,093,952	186,880	7,190,799	8,057,183
Orthopedic surgery	68,230	509,117	1,424,344	525,150	99,617	2,626,458	187,519	4,002,579	7,058,674	1,881,597	247,182	13,377,551	16,004,009
Urology	20,252	92,575	278,424	181,404	41,861	614,516	636,225	3,520,947	7,404,944	1,941,394	184,972	13,688,482	14,302,998
Otolaryngology	39,978	283,743	747,316	237,353	34,729	1,343,119	70,467	1,562,392	3,544,542	845,357	83,232	6,105,990	7,449,109
Medical specialties	271,591	1,204,706	905,236	414,661	248,355	3,044,549	4,790,250	7,183,570	22,368,943	13,226,663	1,596,617	49,166,043	52,210,592
Cardiovascular disease	5,737	23,315	132,506	267,771	156,949	586,278	4,436,281	1,818,872	13,914,951	9,892,156	944,981	31,007,241	31,593,519
Dermatology	262,932	1,175,399	740,425	54,976	6,061	2,239,793	261,284	4,948,752	5,573,315	529,215	28,361	11,340,927	13,580,720
Neurology	2,922	5,992	32,305	91,914	85,345	218,478	92,685	415,946	2,880,677	2,805,292	623,275	6,817,875	7,036,353
All other	87,566	317,783	668,254	646,759	335,084	2,055,446	6,087,461	4,842,460	22,495,379	14,603,845	1,932,579	49,961,724	52,017,170
Overall	742,705	3,790,827	7,133,606	4,730,448	1,933,915	18,331,501	21,079,339	42,703,219	186,654,605	82,839,223	11,311,198	344,587,584	362,919,085

SOURCE: Developed by RTI staff from analysis of the CMS 2002 and 2003 Procedure Code Utilization by Specialty file.

Table 3-3
Frequency of Medicare E&M Office Consults by CPT Code and Specialty, 2002 and 2003

	Office Consults					
	99241	99242	99243	99244	99245	Total
Primary care	72,417	327,871	903,118	1,027,169	494,641	2,825,216
General practice	24,254	106,512	240,406	169,135	56,037	596,344
Internal medicine	31,250	168,249	563,199	755,980	386,225	1,904,903
Pediatrics	332	1,842	4,757	5,750	2,805	15,486
OB/GYN	16,581	51,268	94,756	96,304	49,574	308,483
Surgical specialties	368,774	1,383,184	3,380,667	1,685,352	353,897	7,171,874
General surgery	212,475	522,984	865,954	494,735	156,887	2,253,035
Orthopedic surgery	54,873	322,991	971,183	408,542	84,859	1,842,448
Urology	45,002	231,985	711,450	505,981	74,710	1,569,128
Otolaryngology	56,424	305,224	832,080	276,094	37,441	1,507,263
Medical specialties	158,086	567,699	993,013	2,123,028	1,052,286	4,894,112
Cardiovascular disease	16,933	89,553	510,367	1,172,538	505,832	2,295,223
Dermatology	125,617	436,640	282,611	27,741	2,665	875,274
Neurology	15,536	41,506	200,035	922,749	543,789	1,723,615
All other	189,008	596,950	1,881,716	2,588,291	1,244,913	6,500,878
Overall	788,285	2,875,704	7,158,514	7,423,840	3,145,737	21,392,080

SOURCE: Developed by RTI staff from analysis of the CMS 2002 and 2003 Procedure Code Utilization by Specialty file.

Table 3.3a
Frequency of Medicare E&M New, Established, & Consult Office Visits by CPT Code and Specialty, 2002 and 2003

Specialty	New + Consults	Est + Consults	New+Est Total	% All Visits (new)	% All Visits (est)	% New Visits	% Est Visits	% Overall Visits
Primary Care	8,939,367.56	206,763,873.44	215,703,240.00	0.0233	0.5380	0.3288	0.5790	0.5613
General Practice	3,824,835.04	92,890,906.96	96,715,743.00	0.0100	0.2417	0.1407	0.2601	0.2517
Internal Medicine	4,225,444.23	107,797,638.77	112,023,083.00	0.0110	0.2805	0.1554	0.3018	0.2915
Pediatrics	57,775.26	615,348.74	673,124.00	0.0002	0.0016	0.0021	0.0017	0.0018
OB/GYN	831,313.03	5,459,977.97	6,291,291.00	0.0022	0.0142	0.0306	0.0153	0.0164
	-	-	-	-	-	0.0000		
Surgical Specialties	8,638,374.99	44,346,798.01	52,985,173.00	0.0225	0.1154	0.3178	0.1242	0.1379
General Surgery	1,867,858.06	8,442,359.94	10,310,218.00	0.0049	0.0220	0.0687	0.0236	0.0268
Orthopedic Surgery	3,445,426.14	14,401,030.86	17,846,457.00	0.0090	0.0375	0.1267	0.0403	0.0464
Urology	1,311,993.40	14,560,133.60	15,872,126.00	0.0034	0.0379	0.0483	0.0408	0.0413
Otolaryngology	2,013,097.40	6,943,274.60	8,956,373.00	0.0052	0.0181	0.0741	0.0194	0.0233
	-	-	-	-	-	0.0000		
Medical Specialties	4,794,683.45	52,310,020.55	57,104,704.00	0.0125	0.1361	0.1764	0.1465	0.1486
Cardiovascular Disease	1,407,049.74	32,481,693.26	33,888,743.00	0.0037	0.0845	0.0518	0.0910	0.0882
Dermatology	2,552,790.98	11,903,203.02	14,455,994.00	0.0066	0.0310	0.0939	0.0333	0.0376
Neurology	834,843.72	7,925,125.28	8,759,968.00	0.0022	0.0206	0.0307	0.0222	0.0228
	-	-	-	-	-	0.0000		
All Other	4,812,468.36	53,705,579.64	58,518,048.00	0.0125	0.1397	0.1770	0.1504	0.1523
	-	-	-	-	-	0.0000		
Overall	27,184,894.36	357,126,270.64	384,311,165.00	0.0707	0.9293	1.0000	1.0000	1.0000

NOTE: Consults allocated to New and Established patients based on NAMCS frequency of referred patients.

SOURCE: Developed by RTI staff from analysis of the CMS 2002 and 2003 Procedure Code Utilization by Specialty file.

Table 3-4
CPT Times for 15 New, Established and Consult Office Visits

Office E&M code	Description	CPT Time (in minutes)
New patient		
99201	Problem focused	10
99202	Expanded problem	20
99203	Detailed history/exam	30
99204	Comprehensive history/exam	45
99205	Comprehensive, complex	60
Established patient		
99211	Brief, non-MD	5
99212	Problem focused	10
99213	Expanded problem	15
99214	Detailed history/exam	25
99215	Comprehensive, complex	40
Consult		
99241	Problem focused	15
99242	Expanded problem	30
99243	Detailed history/exam	40
99244	Comprehensive history/exam	60
99245	Comprehensive, complex	80

SOURCE: AMA, CPT 2004, Standard edition. AMA Press, 2003.

Table 3-5
Changes in Volume and Allowed Charges of Medicare E&M Office Visits by CPT Code for Years 1997-1998 and 2002-2003

E&M code (Col 1)	Volume 1997-1998 (Col 2)	Volume 2002-2003 (Col 3)	Volume Changes 2002/03 - 1997/98 (Col 4)	Total Allowed Charges for 2002/2003[a] (Col 5)	Allowed Charge per Service[b] (Col 6)	Change in Allowed Charges[c] (Col 7)	Dollar-Weighted Volume Change[d] (Col 8)
99201	1,035,360	742,705	-292,655	$33,345,500	$45	$-13,139,439	-185,782
99202	3,992,192	3,790,827	-201,365	336,282,073	89	-17,862,973	-252,569
99203	5,959,287	7,133,606	1,174,319	834,389,701	117	137,355,452	1,942,106
99204	3,955,048	4,730,448	775,400	749,146,772	158	122,797,758	1,736,271
99205	2,365,593	1,933,915	-431,678	351,923,958	182	-78,554,554	-1,110,704
99211	15,231,841	21,079,339	5,847,498	455,815,572	22	126,445,172	1,787,842
99212	47,848,191	42,703,219	-5,144,972	1,910,193,819	45	-230,144,096	-3,254,069
99213	150,233,997	186,654,605	36,420,608	10,348,541,587	55	2,019,238,564	28,550,558
99214	60,633,692	82,839,223	22,205,531	7,150,659,875	86	1,916,775,578	27,101,807
99215	11,852,809	11,311,198	-541,611	1,414,081,150	125	-67,710,061	-957,371
99241	941,775	788,285	-153,490	41,993,562	53	-8,176,728	-115,613
99242	2,369,654	2,875,704	506,050	283,340,219	99	49,860,597	704,992
99243	4,367,561	7,158,514	2,790,953	972,893,569	136	379,310,598	5,363,175
99244	4,880,980	7,423,840	2,542,860	1,521,691,894	205	521,219,403	7,369,662
99245	2,514,413	3,145,737	631,324	776,112,232	247	155,759,454	2,202,325
Overall	318,182,393	384,311,165	66,128,772	27,180,411,483	71	4,676,958,146	70,882,630

NOTES:

[a] Total charges not available for 1997-1998.

[b] Column 5 divided by column 3.

[c] Column 4 times column 6.

[d] Column 7 times ratio of (column 4/$71).

SOURCE: Developed by RTI staff from analysis of the CMS 1997 plus 1998, 2002 plus 2003 Procedure Code Utilization by Specialty Files.

services billed to E&M codes 99213 and 99214 (established patient expanded and detailed office visits) contributed over 80% to the increase in total office visit outlays.

A dollar-weighted measure of volume changes (see last column) gives more emphasis to codes with higher allowable fees. For example, the five consult codes, 99241-99245, contributed 6.32 million visits (9.6%) to the change in volumes (Col. 4) on an unweighted basis. When weighted by their higher fees, however, they accounted for an increase of 15.6 million visits (or 24%) on a weighted basis. Overall, the dollar-weighted increase in visits (roughly 70.9 million) was 7.2% greater than on an unweighted basis. Hence, an office visit was likely to be 7.2% more expensive in 2002-2003than five years earlier, holding fee updates constant. If the average Medicare patient's acuity had not changed and physicians did not provide any more visit content, this 7.2% increase in average visit spending could be characterized as "CPT code creep," i.e., physicians shifting to higher-paying codes for the same patient. It is also possible that patient average acuity increased between 1997/98 and 2002/03 due to aging and other factors, in which case the shift to more complex visit codes would be (at least partially) justified.

Table 3-6 captures the shift of physician billings towards higher paying codes. Thus, not only did raw counts of office visits increase by one-fifth in just five years, but the likelihood of using a higher paying code increased dramatically as well.

Table 3-6
Percent Changes in Low- and High-Paying Office Visits, 1997-1998 to 2002-2003

Fee level	New	Established	Consult
Low	-10.9%	+1.1%	+9.6%
High	+11.0%	+20.7%	+33.6%

NOTES:

Low = two lowest paying CPT codes within category

High = three highest paying CPT codes within category

SOURCE: Developed by RTI staff from analysis of the CMS 1997 and 1998, 2002 and 2003 Procedure Code Utilization by Specialty Files.

3.2.2 The National Ambulatory Medical Care Survey

The second analytic data set that was used for this analysis was the Centers for Disease Control and Prevention's (CDC's) National Ambulatory Medical Care Survey (NAMCS). NAMCS began in 1973 and was an annual survey from 1975 until 1981. The survey began again in 1985 and has been used to collect data from office-based physicians on an annual basis since 1989.

Sampling Methods. NAMCS is a national probability sample survey of nonfederally employed office-based physicians. The physicians are randomly selected from the American Medical Association's and the American Osteopathic Association's master files but excludes the specialties of anesthesiology, radiology and pathology. "NAMCS utilizes a multistage probability sample design involving samples of primary sampling units (PSUs), physician practices within PSUs and patient visits within physician practices. PSUs are counties, groups of

counties, county equivalents (such as parishes or independent cities), or towns or townships for some PSUs in New England. Sample physicians were asked to complete Patient Record Forms (PRFs) for a systematic random sample of office visits occurring during a randomly assigned 1-week reporting period." (Woodwell, 1999). According to the NAMCS Data File Documentation (1997), "each physician was assigned a patient-sampling ratio. These ratios were designed so that about 30 PRFs were completed during the assigned reporting week. Physicians expecting a few visits each day recorded data for all of them while those expecting more than a predetermined number of visits per day recorded data for every second, third or fifth visit."

We also note here the change in calculating nonresponse bias that the CDC initiated in 2003. Beginning in 2003, the National Center for Health Statistics revised the estimator used to produce visit estimates for National Ambulatory Medical Care Survey data. The revised estimator takes into account nonresponse from physicians by practice size, as measured by the number of weekly visits, and variability in the number of weeks that participating physicians saw patients during the year. For this reason, estimates from survey year 2003 and beyond are not strictly comparable with those calculated prior to 2003 using the previous estimator.

Survey Content. The PRFs contain demographic information as well as type of patient insurance, reason for visit, physician diagnosis, procedures, screenings and therapeutic services, and types of medication prescribed. The PRFs also ask whether the patient is new or established, whether the patient is a referral from another physician or health plan, and the amount of face-to-face time the doctor spent with the patient. The PRFs for 1993-2003 are attached in ***Appendix 3C***. In ***Appendix 3D*** we include information on the changes that the PRFs have undergone through the years as well as more detailed information on our attempts to make NAMCS conform to Medicare E&M visit codes.

Deletions. Because there was no explicit way to determine whether a PRF office visit was actually billed Medicare using an E&M code, certain exclusions were made to the NAMCS records to conform to Medicare claims. First, we deleted cases involving an ambulatory surgical procedure (when reported separately) was performed, or any case that included an ICD-9 code for an operation (01.00 – 86.99) or for cardiac stress tests or pacemaker checks (89.41-89.50) in any of the “other” categories under diagnostic/screening, therapeutic and preventive services.

Not all special services were deleted. The PRF includes a set of common services that physicians may perform during an office visit. Physicians are allowed to check off which services were performed ranging from diagnostic, screening and imaging services such as blood pressures, pregnancy tests, and x-rays. Visits with these services were not deleted from the sample. For example, a Medicare beneficiary who visited the physician was not excluded if she had her vision screened, her blood pressure taken, and an x-ray performed. However, if she had any type of minor surgery done, she would be excluded.

Second, NAMCS cases were also excluded if the major reason for visit was pre/post-surgery/injury follow-up or nonillness care. Surgeons generally are not allowed to bill for follow-up office visits to surgery within 90 days. Hence, such visits should not appear in the Medicare mix of E&M bills for surgeons. Physicians also do not bill Medicare for nonillness care, such as annual physicals. NAMCS, however, includes such visits. Beginning in 1997-1998, NAMCS included a question regarding the major reason for the patient visit. One option included

"pre/post-surgery/injury follow-up." Because we were unable to remove these cases from the sample for the earlier years (1993-1994), they remain in the trend analysis for *both* the Medicare and non-Medicare populations, but post-surgery visits are not in the validation analysis of Medicare versus NAMCS.

Third, ophthalmologists and psychiatrists were deleted from the analysis because these specialties have other codes, in addition to the E&M codes, that they can bill for office visits. Unfortunately, Medicare did not assign times to these codes.

Problems with Length of Visit. The "duration of visit" question (the 1997 NAMCS changed the wording to "time spent with physician") measures the amount of face-to-face time patients spent with the physician. It does not include time spent with other health care providers, nor the time spent waiting for the physician. If a patient did not see a physician during the visit, duration of visit was indicated as being zero minutes. However, in the CDC's NAMCS Summary for 1997, it was stated that "in the 1996 [and 1995] data, visits at which a physician was seen but which were missing a reported duration were included in the '0' minutes category" (Woodwell, 1999). Because length of visit is integral to our study, we excluded 1995 and 1996 from our trend analysis to not understate the time physicians spent with patients.

Final NAMCS Analytic Dataset. The pooled, 2-year, 1997-1998 and 2002-2003 NAMCS samples used for the length-of-visit validation analysis between Medicare and NAMCS are shown in ***Table 3-7***. Because NAMCS asks whether the patient was new or established, we could distinguish contacts that should be billed to Medicare under CPT codes 99201-99205 or 99211-99215, although Medicare consults first had to be prorated, as described below. The final 1997-1998 NAMCS sample consisted of 6,225 Medicare beneficiaries (5,571 established, 625 new, 29 unknowns). The final 2002-2003 NAMCS sample consisted of 8,251 Medicare beneficiaries (7,443 established, 778 new, 30 unknowns). As shown in the table, 4,184 cases in 1997-1998 and 4,404 cases in 2002-2003 were deleted due to performance of a surgical procedure, a pre-post surgery visit or nonillness visit, a visit to an ophthalmologist or psychiatrist, or other/unknown specialties. The 2002-2003 file sample is larger due to the greater number of Medicare visits in the NAMCS sample frame.

Table 3-8 contains a summary of NAMCS' sample sizes by year from 1993-2003. The trend analysis involved different exclusions than did the validation analysis. In particular, we retained cases for the trend analysis even if the major reason for visit was pre/post surgery or nonillness care.

The overall number of PRFs for NAMCS has changed over the years. For example, in 1993, the CDC reported that 35,978 PRFs had been completed. However, in 1997, only 24,715 PRFs were completed, due mainly to downsizing the sample. There are far fewer Medicare visits in 1998 compared to 1992, 4,544 versus 7,511, respectively. In 1999, however, the number of PRFs began to increase. In 1999, 20,760 PRFs were completed followed by 27,369 in 2000. After a slight decrease in 2001, 28,738 PRFs were completed in 2002 and 25,288 in 2003.

Table 3-7
Final NAMCS Samples in Estimating Medicare Visit Lengths: 1997-1998 and 2002-2003

	Pooled 2-Year NAMCS Data	
	1997 & 1998	2002 & 2003
Initial NAMCS Sample	46,251[a]	54,026
Sample deletions		
Medicare primary payor	10,409	12,655
Deletions	4,205	4,404
• Pre and post surgery, nonillness care	-	1,869
• Ambulatory surgery	2,833[b]	619
• Ophthalmology and psychiatry	1,134	1,135
• Diagnostic screening procs	--	661
Therapeutic screening procs	184[c]	99
• Other specialties	33	21
Final NAMCS sample	6,225	8,251
• New	625	778
• Established	5,571	7,443
• Unknowns	29	30

NOTES:

[a] Includes deletions for ambulatory surgical procedures and operations.

[b] Includes deletions for pre/post surgery, nonillness care.

[c] Includes diagnostic screening visits.

SOURCE: Developed by RTI staff from analysis of the 1997-1998, 2002-2003 NAMCS.

Table 3-8
Final NAMCS Samples for Medicare and Non-Medicare Visit Length Trend Analysis: 1993-2003

	1992	1993	1994	1997	1998	1999	2000	2001	2002	2003
Medicare primary payor	7,511	8,051	7,300	4,949	4,544	4,616	6,074	5,819	6,434	6,221
Deletions	3,708	3727	3,462	808	959	1,294	1,471	1,546	1,663	1,554
Final NAMCS "Medicare" sample	3,803	4,324	3,838	4,141	3,585	3,322	4,603	4,273	4,771	4,667
• new	535	651	506	355	347	295	465	414	422	441
• established	3,268	3,673	3,332	3,760	3,219	3,003	4,101	3,803	4,315	4,226
• unknowns				26	19	24	37	56	34	--
Non-Medicare primary payor	25,795	25,575	23,746	17,916	16,992	15,860	20,836	17,871	21,748	18,765
Deletions	3,197	2,606	1,945	2,318	2,450	3,213	4,063	4,442	4,620	4,210
Final NAMCS "non-Medicare" Sample	22,598	22,969	21,801	15,598	14,542	12,647	16,773	13,429	17,128	14,555
• new	4,797	5,148	4,464	2,408	2,318	1,912	2,923	2,228	2,574	2,181
• established	17,801	17,821	17,337	12,983	12,065	10,537	13,658	11,052	14,439	12,374
• unknowns				207	157	198	192	149	115	--

NOTE:

Medicare sample sizes larger than in Table 3-7 because of inclusion of pre- and post-surgery follow-up and non-illness visits. These visits were included in time trend analysis for 1997-1998 and 2002-2003 because they could not be deleted from other years in NAMCS.

SOURCE: Developed by RTI staff from analysis of the 1993-1994, 1998-2003 NAMCS.

3.2.3 Methods for Comparing 1997 NAMCS Visits and Medicare Claims

NAMCS visits cannot be used directly to validate the Medicare times. While the E&M codes have guideline face-to-face times included in the manual (e.g., 5 minutes for a brief office visit with an established patient), there is no scientific way of classifying the NAMCS visits into CPT codes (and, hence, times). At best, NAMCS visits can be classified as new versus established, but each group corresponds to 5 CPT codes ranging from simple to complex visits.[11] Indirect validation is possible by constructing composite visit lengths in both data bases and compare mean LOVs for groups of patients.

Constructing Average Total, New and Established LOVs. Because we could not perfectly distinguish visits in the NAMCS data that would be billed as Medicare consults, we decided on two methods to report average LOV for the Medicare billed visits: (1) reporting an average Medicare LOV by specialty across the 15 major office visit codes, and (2) reporting results for new and established visits, separately, by first pro-rating the Medicare billed office consults across Medicare new and established visits. The following weighted formula was used to calculate the overall Medicare LOV (from the Medicare billings) for each specialty:

$$(3.1) \quad ALOV\ (MED)_{all} = \sum_j \sum_{cpt,} f_{cpt,\,j} \cdot TIME_{cpt,\,j} \,/\, \sum_j \sum_{cpt,} f_{cpt,\,j}$$

where $ALOV\ (MED)_{all}$ = the average visit length for all 15 billed Medicare visits, $f_{cpt,\,j}$ = the number of new (j=1), established (j=2) or consult (j=3) services within a given CPT code (99201-99205, 99211-99215, 99241-99245, respectively), and $TIME_{cpt,\,j}$ = the guideline times appearing in the CPT manual for new, established, and consult visits (Table 3-4). Frequencies and times were summed across the 15 codes included in each of the three groups to create a weighted average.

To compare Medicare billed with NAMCS' times for new versus established patients separately, billed Medicare consult frequencies had to be assigned either to the Medicare new or established CPT codes. To pro-rate the Medicare consults, we first determined the proportion of new and established visits for NAMCS referred visits by large specialty group (e.g., primary care, surgical specialties, medical specialties and other). The proportions may be found in Table 3-1. The following formulas were used to calculate average LOVs for new and established Medicare billed visits by specialty:

$$(3.2) \quad ALOV\ (MED)_j = \sum_{cpt,} [f_{cpt,\,j}\ TIME_{cpt,\,j} + \alpha_j\ f_{cpt,\,c}\ TIME_{cpt,\,c}] \,/\, \sum_{cpt} [f_{cpt,\,j} + \alpha_j\ f_{cpt,c}]$$

where $ALOV\ (MED)_j$ = the consult-adjusted average visit length for either new (j=1) or established (j=2) Medicare visits, $f_{cpt,\,c}$ = the number of billed office consults within CPT 99241 - 99245, α_j = the proportion of consults assigned to either new or established visits, and $TIME_{cpt,\,c}$ = the guideline times appearing in the CPT manual for consults (Table 3-4).

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[11] Attempts to create a third group of NAMCS consult codes was unsuccessful using the "referral" variable in NAMCS. Far too many "consults" were identified by this variable in 1997 relative to billed consultations.

Using general surgery as an example, the average LOV for new Medicare billings was calculated as follows (Tables 3-1 through 3-4 contain the proportions used to pro-rate the data, the frequencies of services by E&M code, and the times associated with the E&M codes):

[(80,542)*10 + (213,108)*20 + (322,442)*30 + (192,632)*45 + (57,660)*60 +

(.445*212,475)*15 + (.445*522,984)*30 + (.445*865,954)*40 + (.445*494,735)*60 +

(.445*156,887)*80] / [80,542+ 213,108 + 322,442 + 192,632 + 57,660 + 94,551 + 232,728 +

385,350 + 220,157 + 69,815] = 37.17 minutes.

3.3 Comparisons of Average LOVs: Medicare versus NAMCS, 2002-2003

New Patients. ***Table 3-9*** presents 2002-2003comparisons of average LOVs for new patients based on Medicare CPT claims versus NAMCS contacts. Medicare's average LOV is based on Medicare claims for "new" visits (99201-99205) as well as claims for consults (99241-99245) that have been prorated by the distribution of new visits indicated by the NAMCS' referral variable. Also shown in the table are sample-weighted NAMCS average LOVs for new (including referred) patients, the actual number of new NAMCS' patients, the differences in minutes and in percentage between the two means, along with the standard error and the NAMCS 95% confidence intervals for the NAMCS' estimate. A primary care group average is also shown as well as an overall weighted difference across all specialties. Primary care physicians for this analysis include General Practice (GP),including Family Practice (FP), Internal Medicine, Pediatrics, and OB/GYN physicians. Average NAMCS LOV is not shown for Pediatricians as they reported no new visits.

All specialties with more than 30 NAMCS new visits exhibited large negative differences, including 50% shorter NAMCS times for all primary care visits and 45-53% shorter NAMCS General Practitioner and Internist times. NAMCS overall average LOV was 14.25 minutes shorter than Medicare's LOV, a 36% difference.

Although the NAMCS survey adjusts for sampling effects to be nationally representative, the mix of specialty visits is not the same as in the Medicare visit file. Applying the Medicare new visit weights in Table 3-3a (Col. 6) to the specialty-specific NAMCS means produces a somewhat lower NAMCS LOV and an even larger 16.8-minute (43%) discrepancy from Medicare's overall LOV.

Table 3-10 compares Medicare and names average LOV from 1997/98 with 2002/03 for new patients. On average, Medicare claims based on specialties as a group experienced an increase in LOV of 3.7% from 38.1 to 39.5 minutes. Every specialty experienced increases in physician time-with-patients from 1997-1998 to 2002-2003with the exception of neurology.

Table 3-9
Medicare v. NAMCS Length of Visit, New Visits, 2002-2003

	Medicare Average LOV	NAMCS[d] Average LOV	NAMCS N	NAMCS-Medicare Difference (minutes)	NAMCS-Medicare Difference (percent)	NAMCS Standard Error	NAMCS 95% Confidence Intervals
Primary care[a]	39.21	19.61	74	-19.60*	-49.99%	1.44	16.91-23.79
General practice	34.36	18.75	39	-15.61*	-45.43	1.81	14.91-23.59
Internal medicine	43.38	20.44[b]	29	-23.94	-53.88	n/a	n/a
Pediatrics	38.03	--[b]	0	n/a	n/a	n/a	n/a
OB/GYN	40.40	21.19[b]	6	-19.21	-47.55	n/a	n/a
Surgical specialties							
General surgery	37.17	23.88	30	-13.29	n/a	n/a	n/a
Orthopedic surgery	34.56	20.98	55	-13.58*	-39.29	3.99	14.81-27.15
Urology	40.61	21.44	96	-19.17*	-47.20	0.85	19.73-23.16
Otolaryngology	34.37	18.86	129	-15.51*	-45.13	0.79	17.27-20.45
Medical specialties							
Cardiovascular disease	53.55	28.04	67	-24.51*	-46.65	3.37	23.19-33.89
Dermatology	24.00	14.06	36	-9.94*	-41.41	1.40	11.07-17.05
Neurology	58.84	39.82	175	-19.02*	-33.32	3.15	35.53-44.11
All other	46.82	31.00	105	-15.82*	-33.78	3.99	25.38-37.48
Overall	39.51	25.26	767	-14.25*	-36.09	0.60	24.08-26.43
Medicare Weights[c]		23.68		-16.83	-43.6		

NOTES:
* = p<.05.

[a] Primary Care includes General Practice, Internal Medicine, Pediatrics and OB/GYNs.

[b] '--' indicates that sample size was too small to be reliable.

[c] Medicare-weighted NAMCS overall mean LOV based on Medicare visit frequencies.

[d] Specialties are included in Primary Care. Beginning in 2003, the National Center for Health Statistics revised the estimator used to produce visit estimates for National Ambulatory Medical Care Survey data. The revised estimator takes into account non-response from physicians by practice size, as measured by number of weekly visits, and variability in number of weeks that participating physicians saw patients during the year. For this reason, estimates from survey year 2003 and beyond are not strictly comparable with those calculated prior to 2003 using the previous estimator.

SOURCE: Medicare LOV based on paid claims file in 2002-2003; NAMCS LOV developed by RTI staff from analysis of the 2002-2003 National Ambulatory Medical Care Surveys.

Table 3-10
Medicare v. NAMCS Length of Visit, New Visits[a], 1997-1998 and 2002-2003

	Medicare Average LOV		Percent difference in Medicare Average LOV	NAMCS Average LOV		Percent Difference in NAMCS Average LOV
	1997-1998	2002-2003		1997-1998	2002-2003	
Primary care[b]						
General practice	33.5	34.4	5.7%	21.5	18.8	-13.8%
Internal medicine	43.0	43.4	0.9	26.2	20.4	-23.1
OB/GYN	40.3	40.4	0.2	23.1	21.2	-4.1
Surgical specialties						
General surgery	35.3	37.2	5.3	20.7	23.9	15.5
Orthopedic surgery	34.2	34.6	1.0	21.1	21.0	-0.6
Urology	37.3	40.6	8.9	21.7	21.4	-1.2
Otolaryngology	33.7	34.4	5.1	20.9	18.9	-9.8
Medical specialties						
Cardiovascular disease	51.9	53.6	1.3	33.3	28.0	-13.2
Dermatology	23.3	24.0	3.0	15.6	14.1	-9.9
Neurology	58.9	58.8	-0.1	45.7	39.8	-13.9
All Other	46.5	46.8	0.7	33.6	31.0	-7.7
Overall	38.1	39.5	3.7	26.0	25.3	-3.8

NOTES:

[a] With Medicare consults prorated.

[b] Primary care includes General Practice, Internal Medicine, Pediatrics and OB/GYNs.

SOURCE: Medicare LOV based on paid claims file in 2002-2003; NAMCS LOV developed by RTI staff from analysis of the 1997-1998, 2002-2003 National Ambulatory Medical Care Surveys.

The reverse trend occurred among the new NAMCS patients. Overall, specialties experienced a decrease of 3.8% from 26.0 to 25.3 minutes. Individually, each specialty, except general surgery, experienced a decrease in LOV, ranging from 0.6% for orthopedic surgery, to 13.2% for cardiovascular disease.

Established Patients. Even with much larger samples, there were far fewer significant differences found among established patients (***Table 3-11***). The overall Medicare claims-based average LOV for established visits was 18.17 minutes compared to the NAMCS-weighted average LOV of 18.63, implying a slightly longer current physician time-with-patients than when CPT times were first estimated a decade earlier. After adjusting for specialty reporting differences using Medicare claim volumes (Table 3-3a, Col. 7), NAMCS average LOV declines to 18.48 but is still three-tenths of a minute, or 1.7%, longer than Medicare average LOV. There were no significant differences among primary care physicians. There were two significant differences among the surgical specialties. In NAMCS, General Surgeons reported an average LOV of 16.94 minutes for established patients, while in Medicare claims, it was 19.19 minutes, for a difference of 11.7%. Otolaryngologists also reported a 14.1% shorter visit length in NAMCS compared with Medicare claims. Only one medical specialty, neurology, reported a statistically significant 16.5% shorter NAMCS average LOV compared with Medicare claims.

Table 3-12 compares average Medicare and NAMCS LOVs for established patients in 1997-1998 with 2002-2003. Overall, the Medicare LOV increased by 3.1%, from 17.8 to 18.2 minutes. All surgical specialties showed increases. Both general practitioners and internists exhibited increases (5.0% and 1.1%, respectively), while OB/GYNs showed a 4.4% decrease in LOV. General surgeons, urologists, and otolaryngolists had particularly large increases in Medicare LOVs. The specialties of dermatology and neurology also indicated increases, while cardiovascular disease showed a 3.0% decrease.

Overall, average LOV for NAMCS established visits increased 9.4%, from 17.0 minutes to 18.6 minutes, a rate over 4 times faster than in the Medicare claims. All primary care specialties showed an increase, with the largest by OB/GYN of 29.7%. Three of four surgical specialties exhibited increases in visit times across the years, with the exception of general surgery, which had a 3.2% decrease. Dermatology experienced a 11.4% increase, from 11.8 minutes to 13.1 minutes for established patients.

All Patients Combined. ***Table 3-13*** displays the LOV results by specialty for new and established visits (including consults) combined. Two NAMCS overall LOVs are shown at the bottom of the table using NAMCS sampling weights or Medicare claims frequencies.

Table 3-11
Medicare v. NAMCS Length of Visit, Established Visits, 2002-2003

	Medicare Average LOV	NAMCS[d] Average LOV	NAMCS N	NAMCS-Medicare Difference (minutes)	NAMCS-Medicare Difference (percent)	NAMCS Standard Error	NAMCS 95% Confidence Intervals
Primary care[a]	17.64	17.04	2,767	-0.60	-3.39%	0.36	17.23-18.65
General practice	16.93	16.55	1,682	-0.38	-3.22	0.50	15.56-17.53
Internal medicine	18.15	19.62	990	1.47	8.10	0.98	17.68-21.56
Pediatrics	17.91	15.66	41	-3.25	-13.55	1.24	13.99-18.32
OB/GYN	19.65	19.85	54	0.20	1.03	1.27	17.20-23.51
Surgical specialties							
General surgery	19.19	16.94	271	-3.25	-11.72*	0.82	15.29-18.59
Orthopedic surgery	17.26	15.93	273	-1.33	-7.71	1.06	13.81-18.06
Urology	16.87	17.58	758	0.71	4.21	0.64	16.31-18.86
Otolaryngology	18.51	15.90	382	-3.61	-14.10*	0.89	14.13-17.67
Medical specialties							
Cardiovascular disease	19.10	18.99	947	-0.11	-0.57	0.90	17.21-20.78
Dermatology	14.02	13.14	285	-0.88	-6.26	0.83	11.49-14.80
Neurology	26.81	23.38	777	-4.43	-16.53*	1.08	20.23-24.54
All other	19.75	21.20	827	1.45	7.33	1.62	17.97-24.42
Overall	18.17	18.63	7,287	0.46	3.54*	0.12	18.39-18.87
Medicare Weights[c]		18.48		0.31	1.69		

NOTES:

* = p<.05.

[a] Primary Care includes General Practice, Internal Medicine, Pediatrics and OB/GYNs.

[b] '--' indicates that sample size was too small to be reliable.

[c] Medicare visit-weighted NAMCS overall mean LOV.

[d] Specialties are included in Primary Care. Beginning in 2003, the National Center for Health Statistics revised the estimator used to produce visit estimates for National Ambulatory Medical Care Survey data. The revised estimator takes into account non-response from physicians by practice size, as measured by number of weekly visits, and variability in number of weeks that participating physicians saw patients during the year. For this reason, estimates from survey year 2003 and beyond are not strictly comparable with those calculated prior to 2003 using the previous estimator. Medicare weighted NAMCS mean based on Medicare visit frequencies.

SOURCE: Developed by RTI staff from analysis of the 2002-2003 National Ambulatory Medical Care Surveys; Run: sh6_dec07_06

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Table 3-12
Medicare v. NAMCS Length of Visit, Established Visits[a], 1997-1998 and 2002-2003

	Medicare Average LOV		Percent difference in Medicare Average LOV	NAMCS Average LOV		Percent Difference in NAMCS Average LOV
	1997-1998	2002-2003		1997-1998	2002-2003	
Primary care[b]						
General practice	16.1	16.9	5.0%	16.0	16.6	3.4%
Internal medicine	18.0	18.2	1.1	18.0	19.6	9.0
OB/GYN	20.6	19.7	-4.4	15.3	19.9	29.7
Surgical specialties						
General surgery	17.9	19.2	7.2	17.5	16.9	-3.2
Orthopedic surgery	16.9	17.3	3.1	15.9	15.9	0.2
Urology	15.8	16.9	6.8	15.4	17.6	14.2
Otolaryngology	17.6	18.5	5.2	14.1	15.9	13.8
Medical specialties						
Cardiovascular disease	19.7	19.1	-3.0	18.7	19.0	1.6
Dermatology	13.5	14.0	3.8	11.8	13.1	11.4
Neurology	26.5	26.8	1.2	23.7	23.4	-1.4
All other	19.6	19.8	0.8	17.8	19.9	11.6
Overall	17.8	18.2	3.1	17.0	18.6	9.4

NOTES:

[a] With Medicare consults prorated.

[b] Primary care includes General Practice, Internal Medicine, Pediatrics and OB/GYNs.

SOURCE: Medicare LOV based on paid claims file in 2002-2003; NAMCS LOV developed by RTI staff from analysis of the 1997-1998, 2002-2003 National Ambulatory Medical Care Surveys.

The 2002-2003overall LOV in NAMCS was 19.04 minutes compared with 19.68 minutes in Medicare, a statistically significant difference of 3.3%. Using Medicare frequencies, the Medicare average LOV is 4.4% longer than NAMCS' LOV. Eight of 12 specialties had statistically shorter NAMCS times. General practitioners times were 5.7% shorter in NAMCS compared with Medicare claims. Both pediatricians and OB/GYNs also had shorter times in NAMCS as well, 20% and 11% respectively. Three of the surgical specialties reported shorter times in NAMCS compared to Medicare claims: general surgeons reported an average NAMCS LOVs of 17.65 compared with 23.45 minutes in Medicare claims; orthopedic surgeons' NAMCS LOV was 16.80 minutes compared with 20.60 minutes in Medicare; and otolaryngologists' NAMCS LOV was 16.61 in compared with 23.08 minutes in Medicare. All three surgical specialty differences were greater than 18%. Among medical specialists, both dermatologists and neurologists reported 14-16% longer LOVs using Medicare claims compared with NAMCS.

Table 3-14 displays comparisons of overall LOVs in 1997-1998 and 2002-2003 for Medicare and NAMCS. Overall, Medicare claims exhibit a 3.0% increase in LOV. All surgical specialties billed codes with longer times, ranging from 0.5% for orthopedic surgery to 7.1% for general surgery. While general practitioners experienced a 5.4% increase in Medicare LOVs across the years, OB/GYN experienced a 4.3% decrease. Among medical specialties, cardiovascular disease and neurology showed small percent declines in LOVs (-3.8 and -1.8%, respectively), with dermatology having a small increase of 1.8%.

By contrast, NAMCS visits indicated a 7.3% increase in LOV from 1997-1998 to 2002-2003. This rate of increase was about 3.5 times the rate of increase based on Medicare claims. All three primary care specialties showed increases in LOV from 3.6% for general practice to 17.6% for OB/GYN. General surgery and orthopedic surgery had small decreases in LOV, less than 2% each, while urology and otolaryngology had increases of 11.6 and 5.1%, respectively. Cardiovascular disease and dermatology had increases (1.0% and 7.0%), while the LOV for neurology had an 11% decrease.

3.4 Trends in NAMCS Visit Times and Content

This section reports on average lengths of visits for Medicare and non-Medicare patients included in NAMCS surveys for the years 1993-1994 and 1997-2003. Each table reports on the overall average LOVs including new and established patients with prorated consults. We conducted regression analysis by specialty to test for a consistent trend in visit lengths over the decade.

As previously mentioned, the years 1995 and 1996 were excluded due to missing data in the "duration of visit" variable. Unlike the previous analyses, cases whose reason for visit were reported as pre/post-surgery care or non-illness care were retained in the trend analyses because only the 1997-1998 names included this information on the PRF.

Table 3-13
Overall Medicare v. NAMCS Length of Visit, 2002-2003

	Medicare Average LOV	NAMCS[d] Average LOV	NAMCS N	NAMCS-Medicare Difference (minutes)	NAMCS-Medicare Difference (percent)	NAMCS Standard Error	NAMCS 95% Confidence Intervals
Primary care[a]	18.53	18.24	2,851	-0.29	-1.58%	0.55	17.17-19.32
General practice	17.61	16.62	1,728	-0.99	-5.65*	0.48	15.68-17.56
Internal medicine	19.10	19.59	1,022	0.49	3.56	0.93	17.74-21.43
Pediatrics	19.64	15.66	41	-3.98	-20.25*	1.24	13.99-18.32
OB/GYN	23.39	19.99	60	-3.40	-10.72*	1.10	17.70-23.29
Surgical specialties							
General surgery	23.45	17.65	301	-4.80	-21.37*	0.80	16.05-19.25
Orthopedic surgery	20.60	16.80	330	-3.80	-18.45*	1.22	14.36-19.25
Urology	18.83	17.97	858	-0.86	-4.58	0.59	16.81-19.14
Otolaryngology	23.08	16.61	513	-5.47	-24.76*	0.73	15.16-18.05
Medical specialties							
Cardiovascular disease	20.49	19.59	1,016	-0.90	-4.39	0.93	17.73-21.44
Dermatology	15.78	13.27	324	-3.51	-15.90*	0.77	11.73-14.81
Neurology	29.87	25.62	952	-4.25	-14.21*	1.05	23.53-27.71
All other	21.98	23.22	937	0.24	1.10	1.52	19.19-25.25
Overall	19.68	19.04	8,082	-0.64	-3.27*	0.16	18.79-19.28
Medicare Weights[c]		18.82		-0.86	-4.37		

NOTES:
* = p<.05.
[a] Primary Care includes General Practice, Internal Medicine, Pediatrics and OB/GYNs.
[b] '--' indicates that sample size was too small to be reliable.
[c] Medicare visit-weighted NAMCS overall mean LOV.
[d] Specialties are included in Primary Care. Beginning in 2003, the National Center for Health Statistics revised the estimator used to produce visit estimates for National Ambulatory Medical Care Survey data. The revised estimator takes into account non-response from physicians by practice size, as measured by number of weekly visits, and variability in number of weeks that participating physicians saw patients during the year. For this reason, estimates from survey year 2003 and beyond are not strictly comparable with those calculated prior to 2003 using the previous estimator. Medicare weighted NAMCS mean based on Medicare visit frequencies.
SOURCE: Developed by RTI staff from analysis of the 2002-2003 National Ambulatory Medical Care Surveys; Run: sh6_dec07_06

Table 3-14
Overall[a] Medicare v. NAMCS Length of Visit, 1997-1998 and 2002-2003

	Medicare Average LOV		Percent Difference in Medicare	NAMCS Average LOV		Percent Difference in NAMCS
	1997-1998	2002-2003	Average LOV	1997-1998	2002-2003	Average LOV
Primary care[b]						
General practice	16.7	17.6	5.4%	16.2	16.6	3.6%
Internal medicine	19.0	19.1	0.5	18.2	19.6	7.6
OB/GYN	23.4	23.4	-4.3	17.0	20.0	17.6
Surgical specialties						
General surgery	21.0	23.5	7.1	18.0	17.7	-1.9
Orthopedic surgery	20.5	20.6	0.5	17.0	16.8	-1.2
Urology	18.0	18.8	4.6	16.1	18.0	11.6
Otolaryngology	21.4	23.1	3.2	15.8	16.6	5.1
Medical specialties						
Cardiovascular disease	21.3	20.5	-3.8	19.4	19.6	1.0
Dermatology	15.5	15.8	1.8	13.4	13.3	7.0
Neurology	30.4	29.9	-1.8	28.8	25.6	-11.0
All other	21.6	23.0	1.7	19.2	23.2	15.7
Overall	19.3	19.7	3.0	17.6	19.0	8.0

NOTES:

[a] Includes new, established, and consult visits.

[b] Primary care includes General Practice, Internal Medicine, Pediatrics and OB/GYNs.

SOURCE: Medicare LOV based on paid claims file in 2002-2003; NAMCS LOV developed by RTI staff from analysis of the 1997-1998, 2002-2003 National Ambulatory Medical Care Surveys.

All Medicare Patients. ***Table 3-15*** presents findings on trends in NAMCS LOVs for all Medicare patients for the years 1993-1994 and 1997-2003. Overall, there were no statistically significant trends in LOV from 1992 to 2003. In 1992, the overall LOV was 18.18 for Medicare patients; by 2003 it was 19.27 minutes. Although no consistent trend was found, the last few years suggest an increase in LOV. Yet, even this trend is driven by the large increase in 2003.

No individual specialty experienced significant change in LOV from 1993-2003. Comparing only 1992 to 2003, all primary care specialties experienced increases in time, ranging from 0.27 minutes for internists to 3.55 minutes for OB/GYN. All surgical specialties, except urology, had decreases in time – from 0.24 minutes for orthopedic surgery to 1.43 minutes for otolaryngology. Urology shows an increase of 0.69 minutes. All medical specialties experienced decreases in average LOV: from 0.3 minutes for neurology to nearly 2 minutes for cardiovascular disease.

All Non-Medicare Patients. ***Table 3-16*** presents trends in NAMCS LOVs for non-Medicare patients for the years 1993-2003. Generally, there were no consistent trends across the years with each specialty experiencing both "peaks and valleys" in average LOVs from 1992 to 2003. Overall, using regression analysis, there was a statistically significant increase in LOV. Non-Medicare visit lengths generally increased through 1999, then dipped in 2000-02 before peaking in 2003 at 17.79 minutes.

Among primary care specialties, pediatricians' LOVs also experienced a statistically significant increase. All primary care specialties exhibited longer average LOVs in 2003 than in 1992 with general practice experiencing the largest increase of 3.2 minutes. Both OB/GYNs and internists had increases of over one minute each.

All surgical specialties, except general surgery, had longer LOVs in 2003 than in 1993. The increases ranged from 0.51 minutes for orthopedic surgery to 3.58 minutes for otolaryngology. General surgery had a decrease of 0.3 minutes.

Neurology and cardiovascular disease experienced the largest decreases in LOV among medical specialties, i.e., 3.2 and 1.6 minutes, respectively. Dermatology had an increase of 0.9 minutes.

Comparison between the Medicare and non-Medicare Populations. Overall, for each year, the average LOVs are approximately one minute longer for the Medicare population than they are for the non-Medicare population. However, looking specifically at 2003, not all specialties indicate longer average LOV for Medicare patients compared to non-Medicare patients. Two of the surgical specialties – orthopedic surgery and urology – have longer average LOV for non-Medicare patients than for Medicare patients (16.22 versus 16.16 and 18.92 versus 17.91, respectively). In addition, all medical specialties indicate longer average LOV for non-Medicare patients than for Medicare patients. For example, cardiovascular disease has an average LOV of 21.21 minutes for non-Medicare patients compared to 20.39 minutes for Medicare patients. Dermatology and neurology also report LOVs that are nearly one-minute longer for non-Medicare patients compared to Medicare patients (14.62 versus 13.34 and 26.67 versus 25.79, respectively).

Table 3-15
Trend in Average NAMCS Length of Visit for All Medicare Patients 1993-2003 (in minutes)

	1992	1993	1994	1997	1998	1999	2000	2001	2002	2003
Primary care[a]	17.92	18.33	18.52	17.88	17.27	18.80	17.51	18.28	18.44	18.67
General practice	17.05	17.31	17.05	15.88	16.82	18.92	15.94	16.27	16.18	17.72
Internal medicine	19.25	19.11	19.76	19.74	17.82	18.96	18.68	20.05	20.40	19.52
Pediatrics	17.81	21.74	13.27	21.54	16.22	--	14.92	--	17.32	--
OB/GYN	16.21	16.67	20.69	17.25	16.54	16.38	18.98	20.04	18.48	19.76
Surgical specialties										
General surgery	16.73	15.39	16.39	15.17	17.94	18.15	18.68	14.91	17.15	16.34
Orthopedic surgery	16.40	14.00	16.57	14.37	18.69	16.16	16.83	13.80	15.98	16.16
Urology	17.22	15.60	15.45	16.90	14.04	16.27	15.42	17.66	17.50	17.91
Otolaryngology	19.40	16.37	15.80	15.47	15.48	13.59	15.00	14.57	14.32	17.97
Medical specialties										
Cardiovascular disease	23.37	23.92	21.76	20.07	18.98	18.49	19.01	21.92	18.32	20.39
Dermatology	14.57	11.33	14.36	11.92	11.60	13.36	13.76	13.61	13.03	13.34
Neurology	26.09	30.21	28.66	24.86	29.30	23.50	26.17	26.05	25.44	25.79
All other	19.04	20.23	20.59	18.63	20.01	19.54	20.30	19.54	19.84	21.66
Overall	18.18	18.03	18.56	17.67	17.77	18.38	17.94	18.34	18.47	19.27

NOTES:

a Primary care includes General Practice, Internal Medicine, Pediatrics and OB/GYNs.

"—" indicates that sample size was too small to be reliable.

SOURCE: Developed by RTI staff from analysis of the 1993-2003 National Ambulatory Medical Care Surveys.

Table 3-16
Trend in Average NAMCS Length of Visit for All Non-Medicare Patients 1993-2003 (in minutes)

	1992	1993	1994	1997	1998	1999	2000	2001	2002	2003
Primary care[a]	15.48	16.18	16.14	16.02	16.05	16.86	16.37	15.90	16.17	17.19
General practice	14.92	14.85	15.92	15.72	16.22	16.05	15.56	15.86	14.79	17.14
Internal medicine	17.94	20.48	18.83	18.46	17.27	19.41	18.70	17.57	18.50	19.06
Pediatrics	15.09	14.27	14.03	13.94	15.31	15.10	14.90	14.83	15.39	15.85*
OB/GYN	14.91	16.89	16.93	16.67	14.94	17.01	17.91	15.69	17.46	16.67
Surgical specialties										
General surgery	15.7	16.25	16.01	14.87	16.27	17.27	17.78	17.57	17.66	15.39
Orthopedic surgery	15.71	14.29	16.12	15.64	16.82	16.68	16.62	14.41	16.27	16.22
Urology	17.92	15.9	18.4	16.46	16.77	17.03	14.55	18.17	16.74	18.92
Otolaryngology	13.74	15.17	16.12	15.22	14.67	14.10	15.41	15.05	14.83	15.82
Medical specialties										
Cardiovascular disease	23.78	20.78	23.59	19.73	18.82	19.08	21.13	19.75	19.71	21.21
Dermatology	13.68	13.65	13.71	13.61	13.65	13.96	14.82	14.19	13.38	14.62
Neurology	28.82	29.49	33.45	27.3	29.46	24.49	28.17	26.25	26.42	26.67
All other	20.08	19.9	19.52	21.49	20.11	20.47	23.15	21.47	18.50	21.98
Overall	15.98	16.47	16.74	16.64	16.53	17.30	17.13	16.66	16.51	17.79*

NOTES:
[a] Primary care includes General Practice, Internal Medicine, Pediatrics and OB/GYNs.
* The difference from 1993-2003 is statistically different at the 95% confidence interval.

SOURCE: Developed by RTI staff from analysis of the 1993-2003 National Ambulatory Medical Care Surveys.

3.5 Summary of Findings

Over-estimated Visit Lengths. In 1997/98, based on submitted Medicare claims, the overall face-to-face time with the physician averaged 19.3 minutes across 15 office-based visit and consultation CPT codes. This visit length was 8.8%, or 1.7 minutes, "longer" than reported by physicians in the NAMCS survey for similar kinds of office visits. Five years later, our re-analysis of 2002/03 data shows some narrowing of the discrepancy. Medicare claims-based office visit lengths averaged 19.7 versus 19.0 minutes in NAMCS, producing a 0.7-minute differential, or 3.3% "longer" visit lengths based on Medicare claims. Although the gap has narrowed, it remains statistically significant at the 95% confidence level. Reweighting NAMCS LOVs for the difference in specialty mix, Medicare claims exhibit a 4.4% longer LOV versus NAMCS.

As in 1997/98, the difference in visit lengths between the two data sources in 2002/03 occurs primarily among new (plus consult) visits. In 1997/98, claims-based visit lengths were 26% longer than reported in NAMCS, a gap that widened to 36% five years later (i.e., 39.5 versus 25.3 minutes). By contrast, established visits (also including prorated consults), were 4.5% longer based on Medicare submitted claims than in the NAMCS survey but became 3.5% shorter than in NAMCS five years later.

The correct interpretation of the difference between Medicare claims-based and NAMCS-based visit lengths is dependent upon three general assumptions; namely, after deletions,

1. The type of NAMCS and Medicare claims-based office visits is similar
2. The visit content between the two data sets also is similar
3. The degree of task delegation to non-physicians is also similar between the two data sets.

Extensive effort was made to conform the NAMCS set of reported office visits to the set of visits that would be billed to Medicare under the 15 office visit and consult CPT codes. If, in addition,

4. Physicians choose the correct CPT office visit code based solely on visit content and not primarily upon actual time with the patient,[12]

then the shorter visit times in NAMCS versus in Medicare claims in 2002/03 implies that the guideline times overstated the actual face-to-face times a decade after they were first established. Given that time-with-patients was found to be correlated 0.90 with relative work effort, shorter actual times a decade later imply less work effort on the part of physicians—at least for nonsurgical visits in their offices.

[12] If physicians always chose a CPT code with the guideline time suggested in the CPT manual, then no differences should ever be found between the two data sets.

Physicians, by contrast, may not be using the office visit codes correctly. CMS' Office of the Inspector General has found substantial "incorrect [up-]coding" of physician claims (Part B News, March 27, 2000). Under this scenario, physicians may be billing higher content, longer visit, CPT codes than a true audit of visit content would justify, in which case the longer claims-based average visit length is more apparent than real.

It seems reasonable to expect that both types of physician behavior are occurring over time. Previous CMS investigations have uncovered extensive upcoding of visits to higher paying codes. However, the very long visit lengths for the more "complex" new patients and for consults in the original Harvard-AMA surveys in the early 1990s, seem unlikely ten years later. The two most complex new visit codes 99204/5 involve 45 and 60 minutes face-to-face with the patient, respectively. The two most complex office consult codes 99244/45 involve 60 and 80 minutes, respectively. In both 1997/98 and 2002/03, these two codes accounted for nearly one-half of all office consults, implying that physicians are spending over an hour, face-to-face, with the patient for one-out-of-two consultations. Moreover, the billed frequency of consult 99243 involving 40 minutes with the physician increased by nearly two-thirds over just a 5-year period. If consultants are providing the visit content for these more comprehensive visits, then it is questionable whether they are averaging 40, 60, or 80 minutes with the patient. On the other hand, they may be billing for more work effort than they are actually providing during these very long, expensive visits.

Policy Implications. The policy implications are somewhat different depending upon the extent of upcoding versus declining visit times, although the overall implication for increases in Medicare spending on physician office visits may be similar. If lengths of visit have been declining especially for more complex new and consult patients, then physician work RVUs should be reduced for these services with no corresponding increase in RVUs for "shorter" visits. With lower work RVUs, these visits would be allocated fewer practice expense RVUs as well. If upcoding explains much of the difference in visit lengths, then more assiduous review of visit content and physician face-to-face times with patients should be undertaken, resulting in fewer paid claims for the more expensive visits. Either of these policy prescriptions would result in slower growth in office visit outlays by Medicare.

Growth in Office Visits and Medicare Spending. Although not the primarily focus of a study of secular productivity gains in physicians' offices, it is worth noting for policy purposes the rapid increase in Medicare billed office visits over a short 5-year period. In just five years, regular office and consult visits, excluding those for major diagnostic tests and minor surgery, increased by 66 million, or 17.2%. This increase in volume added $4.7 billion to Medicare outlays over 2002-2003, or $3.4 billion on an annual basis. Raw volume counts, however, understate the cost implications to Medicare. Higher paying consult codes increased at double the overall rate for other visit codes. Of the six lowest paying new, established, and consult visits, four experienced actual volume declines. The shift to higher paying codes, alone, over the 5-year period resulted in the 15 types of office visits costing Medicare 7.2% more, on average, or an extra $1 billion annually by 2003. The two most costly office consult codes, 99244/45, with average payments of $226 per consult, increased 43% between 1997-1998 and 2002-2003. Together, their increased volume added $340 million to Medicare outlays in 2003, even though the two visit codes accounted for under 3% of total volume attributed to the 15 visit codes as a whole.

SECTION 4
VALIDATING INTRA-SERVICE SURGICAL TIMES FROM PHYSICIAN SURVEYS USING OPERATING ROOM LOGS

4.1 Introduction

4.1.1 Background

A major component of work for all physician services is intra-service time, which is clearly defined in the Medicare fee schedule as the face-to-face time of physicians with patients for evaluation and management services and skin-to-skin time for surgical procedures. The Harvard RBRVS study used time as a fundamental component in determining physician work (Hsiao *et al.* 1988; Hsiao *et al.* 1990; Hsiao *et al.* 1991) and demonstrated a strong positive correlation between intra-service time and work within broad clinical families of services. Thus, a significant change in time is likely to lead to a clinically meaningful change in work.

Service times have been included in the MFS using surveys of physicians, starting with Harvard in the development of the RBRVS payment system. Since then, when work RVUs have been updated or new CPT codes are added, estimates of physician time have been collected through the AMA's RUC survey process. Comparisons of RUC-generated service time estimates in the mid-1990s showed systematically longer times than the times measured by the original Harvard study (Dunn and Latimer 1996). Across all services, the RUC intra-service time estimates are on average 14% longer than those measured by Harvard, whereas total service times are 25% longer. The differences ranged from 6% shorter to 70% longer. Given the systematic differences in surveyed times between Harvard and the RUC, and the escalating requests for higher work RVUs from the RUC's specialty societies, it is imperative to validate intra-service times with data collected through other means.

4.1.2 Purpose of the Study

Our study replicates earlier work conducted for CMS by staff, now at Research Triangle Institute (McCall *et al.*, 2001; McCall *et al.*, 2006), which provided a validation of intra-service (skin-to-skin) times for sixty surgical procedures, including many of the RUC's Multiple Points of Comparison (MPCs). During the annual and 5-year updating of the MFS, the MPC reference list has been used to provide standard points of comparison of physician work. Several years ago, we compared intra-service time from the original Harvard study and RUC intra-service times with skin-to-skin times calculated directly from operative log reports collected from 148 hospitals by DJ Sullivan Healthcare Consulting, Inc. (SHC) in 33 states between April 1, 1993 and October 30, 1999. This study builds for DHHS/ASPE upon our prior work for CMS using the same data source and analyzing some of the same surgical procedures in the original study with more recent operating room log data as well as analyzing some new surgical procedures.

4.2 Data Source

The data for our validation study come from DJ Sullivan Healthcare Consulting, Inc. (SHC), an operating room management consulting firm. They maintain a Surgery Benchmark & Management Information Service (MIS) designed to provide hospitals with comparative information on surgical service performance. Dates of surgery range from January 1, 2001

through December 31, 2005. The database contains over 900,000 inpatient and outpatient operative records. However, only 113,455 are from hospitals located in the United States; the rest are from Canada. We restrict our analyses to 33 U.S. hospitals ranging from small community to major university teaching hospitals. These hospitals are located in 19 states representing all regions of the country except Alaska.

The operative logs contain narrative descriptions of the surgical procedure(s) recorded by the circulating nurse at the time of the procedure. The descriptions were expanded to 216 characters compared to the 40 characters in our previous study. This allowed for much more precise matching of descriptions to CPT codes since there are no CPT codes recorded on the operative logs. Narrative descriptions that suggested multiple procedures are dropped from our analysis because RUC times are obtained only for stand-alone surgeries.

Approximately 19,000 operative logs were assigned to 22 CPT surgical codes either from our past study or new procedures from a broader family of codes. A clinician assigned CPT codes based on clinical judgment and knowledge of correct coding guidelines for physician services. Project staff conducted a final review of CPT coding assignment for face validity. The number of cases assigned to surgical CPT codes ranged from a low of 73 assigned to endoscopic carpal tunnel release to a high of 5,204 assigned to laparoscopic cholecystectomy. Fifty percent of the procedures had more than 250 cases (with more than three-quarters having more than 100 cases) and nearly 30% have more than 1,000 cases. Five CPT codes with less than 100 observations were dropped from the analysis. Of the remaining 17 CPT codes, 12 are part of the RUC's MPC set while 12 are procedures previously studied by us.

4.3 Methods

4.3.1 Estimation of Typical Times

Estimates of intra-service, or skin-to-skin, time were constructed as the difference between incision and closure time as reported on the operative logs. We used Harvard's geometric mean estimation method at the CPT code level using the natural log of intra-service time because transformed data are more normally distributed for statistical analyses (Hsiao *et al.*, 1988b, p. 2363). (See Section 6.2.1 for description of CMS' TIMEDATA file.)

Operation logs with intra-service times three standard deviations above or below the mean were deleted. Three iterations of trimming were undertaken to calculate the final geometric mean time. With large sample sizes, geometric mean times are essentially equivalent to median times used by the AMA RUC (Ramsey and Schafer, 2002). In this study, we report comparisons of operative log geometric mean times to RUC or Harvard time estimates, depending on which value is present in the CMS TIMEDATA file for each CPT code. Seven of the 17 codes involved comparisons between operating log times and the original Harvard time estimates obtained more than 15 years ago. The other 10 codes were compared with RUC surveyed times since the implementation of the MFS. The source of the comparison mean times is noted on the tables.

4.3.2 Sample Bias

In our previous operating log intra-service time study, an analysis of variance indicated that mean intra-service times differed significantly by hospital setting. This is likely reflecting

differences in the case mix of patients across hospital types or regional variation in surgical practice patterns. To adjust for non-randomness in the sample, we weighted the operating room log data to reflect the distribution of Medicare fee-for-service cases across hospital types using a 36-cell matrix (3x3x4) created by the intersection of three categories of hospitals based on the number of operating rooms, four geographic regions of the country, and three teaching status groups. The number of surgeries performed was used to proxy the number of operating rooms. However, we also observed that analyses of intra-service time within these stratifications revealed a pattern consistent with the overall findings, namely, that the RUC times were consistently higher than the objective time estimates within each stratum.

Because our current sample of data for 2001–2005 is considerably smaller in this study, we do not have sufficient numbers of cases distributed across the 36 weight cells to produce meaningful weighted geometric mean times for a number of the procedures. Thus, we report the geometric means unweighted; however, we do conduct comparisons within each stratum. Although the mean operating room times could be biased if particular hospitals with very short or very long operating room times are over-represented in the SHC data, we note that there is no CMS requirement that the RUC produce nationally representative time estimates across hospital settings.

4.3.3 Statistical Testing

Statistical comparisons between the estimated geometric mean intra-service times derived from operative logs and RUC or Harvard median times are made using the Wilcoxon signed rank test, the nonparametric analog of the paired-sample t-test. The null hypothesis underlying the signed rank test is that the difference between the median times is zero.

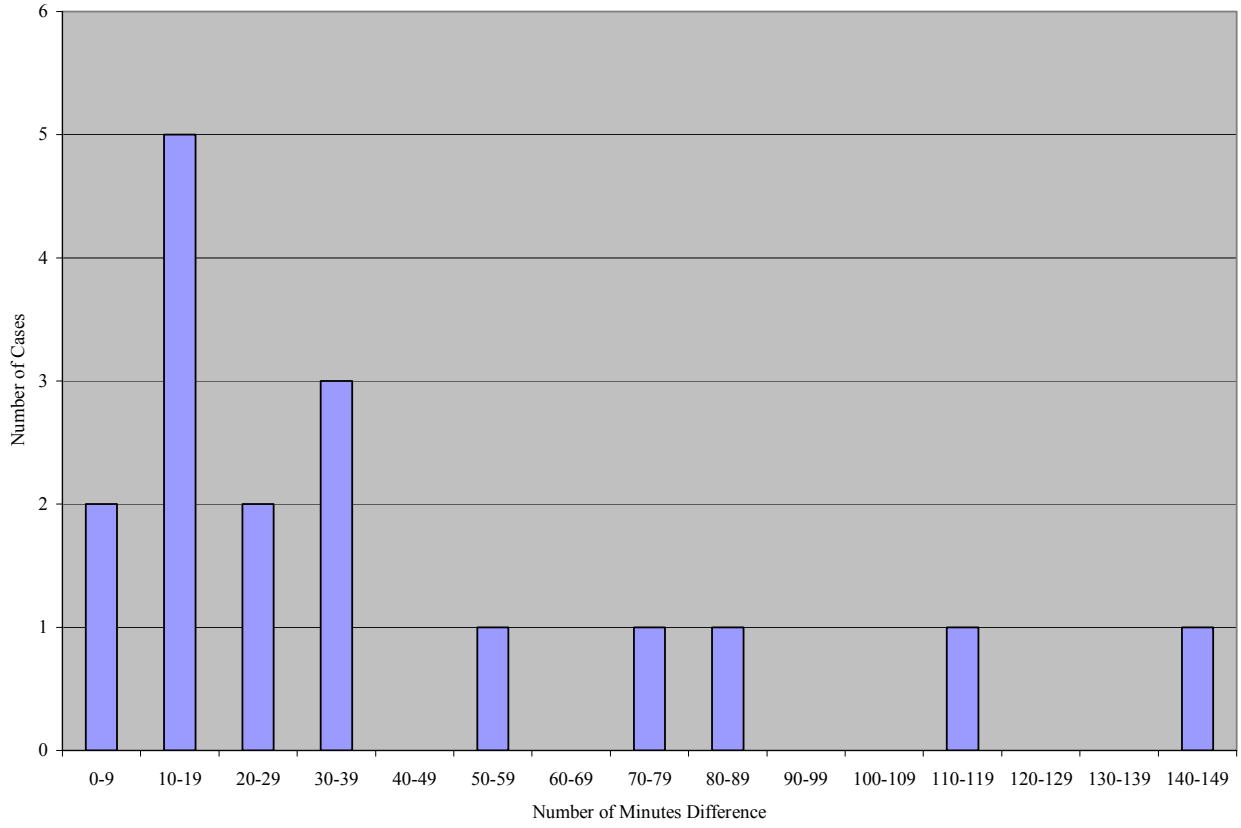
4.4 Results

Figure 4-1 provides a visual comparison of differences between the RUC/Harvard physician-reported median intra-service times and those calculated from the operating room log database for 17 selected surgical procedures. The results in Figure 4-1 exhibit the same observed pattern as in our previous study; namely, the RUC and Harvard median intra-service times are significantly longer than the intra-service times from the operating room log database. All differences are statistically significant. The volume-weighted average difference in minutes across the 17 surgical procedures is 29 minutes. The range of differences is from 11 minutes to almost 3 hours, with 8-of-17 exhibiting differences of more than 30 minutes and 2-of-17 services with more than a 60-minute difference.

Table 4-1 displays statistical comparisons of intra-service operative log times with RUC/Harvard times by CPT code. The results in all the tables are divided into two groups: those included in the MPC list are listed first, and those that are not part of the MPC are listed second. These procedures have mean operative times ranging from 15 minutes to nearly 3 hours (180 minutes) and span the major surgical specialties. The RUC/Harvard physician survey time estimates are all longer than those based on operating room log data. The range of differences is 8 minutes for a diagnostic bronchoscopy (CPT 31622) to 92 minutes longer for a radical nephrectomy (CPT 50230). The degree of overstatement ranges from 17% for a hip hemiarthroplasty (CPT 27125) to 281% for an ureteroscopy and stone extraction (CPT 52320).

The results observed in this study mirror those reported in our prior CMS analyses (McCall *et al.*, 2006).

Figure 4-1
Distribution of Differences in RUC/Harvard Median Times Compared to Operating Room Log Geometric Mean Intra-Service Times for 17 Selected Surgical Procedures, 2001-2005



SOURCE: CMS TIMEDATA file; DJ Sullivan operating room logs, 2001-2005.

Tables 4-2, ***4-3***, and ***4-4*** display comparisons between RUC/Harvard survey-based times and operating room log data within four geographic regions of the country, three teaching status groups (i.e., non-teaching, minor teaching, and major teaching), and three categories of hospital size based on number of operating rooms (i.e., less than eight rooms, eight to 14 rooms, and 15 or more), respectively. The overall pattern of significant overstatement of survey-based time disparity remains. Of 42 geographic comparisons made between the RUC/Harvard times and the operating room times, all but two are statistically significant and all RUC/Harvard times are significantly longer. For example, RUC estimated median surgical times for reduction mammoplasty were 54 minutes longer in the northeast and 34 minutes longer in the south (Table 4-2). There is no obvious pattern across the geographic regions.

Of the 29 teaching status comparisons made between the RUC/Harvard times and the operating room times, all were statistically significant with all but four comparisons showing RUC/Harvard times being significantly longer (Table 4-3). However, there is less disparity between RUC/Harvard times and the operating room times for major teaching hospitals. This may reflect a more complex case mix and/or use of residents within major teaching hospitals that lengthens operating times and raises an obvious question about the distribution of survey respondents within the survey RUC process. A mal-distribution of survey respondents tilted toward major teaching hospitals or a frame of reference using the most complex case could be major sources of the disparity.

Of 40 operating room size comparisons made between the RUC/Harvard times and the operating room times, all but one is statistically significant and all RUC/Harvard times are significantly longer (Table 4-4) with one exception. There is no obvious pattern across the size of operating rooms.

Our last comparisons are made for the subset of procedures that were previously studied using 1993–1999 operating room log data (McCall et al., 2001, 2006). ***Table 4-5*** displays the comparison of the operative log geometric mean times for 1993–1999 with operative log geometric mean times for 2001–2005. Of the 12 surgical procedures previously studied, one procedure, bilateral mammoplasty (CPT 19318) has an increase in its mean time between the two time periods. In contrast, nine of the 12 procedures experienced declines in their average intra-service times. Two procedures, diagnostic bronchoscopy (CPT 31622) and open carpal tunnel release (CPT 64721) have geometric mean intra-service times that remain unchanged.

Table 4-1
Comparison of Differences in Intra-Service Times Between Operative Log Data and RUC/Harvard Times, for Selected Surgical Procedures by Those in the Multiple Point of Comparison (MPC) List and Those Not Included in the MPC List, 2001-2005

CPT Code	CPT Description	Number of Observations	Operative Log Geometric Mean Time (Minutes)	Difference between RUC/Harvard Median Time and Operative Log Geometric Mean Time (Difference in minutes)
In MPC List				
Integumentary System Surgery				
19318[c]	Reduction mammoplasty	279	178	+47[b]
Musculoskeletal System Surgery				
27125	Hip hemiarthroplasty	224	72	+12[a]
29881	Knee arthroscopy/partial meniscectomy	654	32	+34[a]
Respiratory System Surgery				
31622	Bronchoscopy	269	22	+8[b]
33208	Implant pacemaker dual chamber	210	44	+16[b]
Cardiovascular System Surgery				
35301	Carotid artery endarterectomy	697	93	+51[b]
Urinary System Surgery				
50230	Radical nephrectomy	131	130	+92[a]
52320	Ureteroscopy and stone extraction	244	15	+43[a]
52601	Transurethral resection prostate	541	39	+36[b]
Female Genital System Surgery				
58150	Total abdominal hysterectomy	1,835	90	+30[b]
Nervous System Surgery				
64721	Open carpal tunnel release	1,082	16	+9[b]
Eye Surgery				
66984	Extracapsular cataract removal with insertion of intraocular lens	2,949	20	+10[b]
Not in MPC List				
Musculoskeletal System Surgery				
27130	Total hip arthroplasty	837	99	+36[b]
Digestive System Surgery				
47562	Laparoscopic cholecystectomy	5,180	55	+25[b]
47563	Cholecystectomy with cholangiography	1,490	51	+92[a]
Urinary System Surgery				
55840	Prostatectomy retropucid radical	122	129	+54[a]
Female Genital System Surgery				
58120	D & C	1,759	11	+14[b]

NOTES:

[a] Difference based on Harvard times.

[b] Difference based on RUC times.

[c] The operative log data represent bilateral reduction mammoplasties. In our review of the operative logs' narrative descriptions, we observed virtually all reduction mammoplasties being performed as a bilateral procedure. Following CMS's payment policy of inflating payment by 50% when a bilateral procedure is performed, we inflated the RUC time estimates by 50% prior to comparison with operative log mean time estimates.

1. Statistical significance assessed using Wilcoxon Signed Rank Test. All differences are statistically significant at the $p<0.05$ level or better.
2. CPT codes with fewer than 100 operative logs for estimation of mean are excluded from this table.

SOURCE: CMS TIMEDATA file; DJ Sullivan operating room logs, 2001-2005

Table 4-2
Comparison of Differences in Intra-Service Times Between Operative Log Data and RUC/Harvard Times, for Selected Surgical Procedures by Region, 2001-2005

CPT Code	CPT Description	Number of Observations	Operative Log Geometric Mean Time (Minutes)	Difference between RUC/Harvard Median Time and Operative Log Geometric Mean Time (Difference in minutes)
In MPC List				
Integumentary System Surgery				
19318[c]	Reduction mammoplasty			
	• Northeast	192	171	+54[b]
	• South	50	191	+34[b]
Musculoskeletal System Surgery				
27125	Hip hemiarthroplasty			
	• Northeast	171	68	+16[a]
29881	Knee arthroscopy/partial meniscectomy			
	• Northeast	639	32	+34[a]
Respiratory System Surgery				
31622	Bronchoscopy			
	• Northeast	59	19	+11[b]
	• Midwest	78	18	+12[b]
	• South	103	25	+5[b NS]
33208 - Implant pacemaker dual chamber				
	• Northeast	127	46	+14[b]
	• Midwest	83	40	+20[b]
Cardiovascular System Surgery				
35301	Carotid artery endarterectomy			
	• Northeast	363	111	+33[b]
	• Midwest	144	61	+83[b]
	• South	146	101	+43[b]
Urinary System Surgery				
50230	Radical nephrectomy			
	• Northeast	64	155	+67[a]
52320	Ureteroscopy and stone extraction			
	• Northeast	242	15	+43[a]
52601	Transurethral resection prostate			
	• Northeast	399	36	+39[b]
	• South	93	53	+22[b]
Female Genital System Surgery				
58150	Total abdominal hysterectomy			
	• Northeast	753	89	+31[b]
	• Midwest	82	68	+52[b]
	• South	743	98	+22[b]
	• West	257	82	+38[b]

(continued)

Table 4-2 (continued)
Comparison of Differences in Intra-Service Times Between Operative Log Data and RUC/Harvard Times, for Selected Surgical Procedures by Region, 2001-2005

Nervous System Surgery				
64721	Open carpal tunnel release			
	• Northeast	291	19	+6[b]
	• Midwest	113	15	+10[b]
	• South	601	14	+11[b]
	• West	77	26	-1[b NS]
Eye Surgery				
66984	Extracapsular cataract removal with insertion of intraocular lens			
	• Northeast	1,840	20	+10b
	• Midwest	166	13	+17b
	• South	840	21	+9b
	• West	103	27	+3b
Not in MPC List				
Musculoskeletal System Surgery				
27130	Total hip arthroplasty			
	• Northeast	476	104	+31[b]
	• Midwest	94	100	+35[b]
	• South	247	89	+46[b]
Digestive System Surgery				
47562	Laparoscopic cholecystectomy			
	• Northeast	1,503	68	+12[b]
	• Midwest	564	40	+40[b]
	• South	2,101	50	+30[b]
	• West	1,012	57	+23[b]
47563	Cholecystectomy with cholangiography			
	• Northeast	1,038	48	+95[a]
	• South	275	51	+92[a]
	• West	158	73	+70[a]
Urinary System Surgery				
55840	Prostatectomy retropucid radical			
	• Northeast	118	127	+56[a]
Female Genital System Surgery				
58120	D & C			
	• Northeast	1,243	11	+14[b]
	• South	352	11	+14[b]
	• West	132	13	+12[b]

NOTES:

[a] Difference based on Harvard times.

[b] Difference based on RUC times.

[c] The operative log data represent bilateral reduction mammoplasties. In our review of the operative logs' narrative descriptions, we observed virtually all reduction mammoplasties being performed as a bilateral procedure. Following CMS's payment policy of inflating payment by 50% when a bilateral procedure is performed, we inflated the RUC time estimates by 50% prior to comparison with operative log mean time estimates.

1. Statistical significance assessed using Wilcoxon Signed Rank Test. All differences are statistically significant at the $p<0.05$ level or better.
2. CPT codes with fewer than 100 operative logs for estimation of mean are excluded from this table.

SOURCE: CMS TIMEDATA file; DJ Sullivan operating room logs, 2001-2005

Table 4-3
Comparison of Differences in Intra-Service Times Between Operative Log Data and RUC/Harvard Times, for Selected Surgical Procedures by Teaching Status, 2001-2005

CPT Code	CPT Description	Number of Observations	Operative Log Geometric Mean Time (Minutes)	Difference between RUC/Harvard Median Time and Operative Log Geometric Mean Time (Difference in minutes)
In MPC List				
Integumentary System Surgery				
19318[c]	Reduction mammoplasty			
	• Non-teaching	168	167	+58[b]
	• Minor Teaching	50	205	+20[b]
	• Major Teaching	61	190	+35[b]
Musculoskeletal System Surgery				
27125	Hip hemiarthroplasty			
	• Non-teaching	50	60	+24[a]
	• Major Teaching	134	78	+6[a]
29881	Knee arthroscopy/partial meniscectomy			
	• Non-teaching	609	32	+34[a]
Respiratory System Surgery				
31622	Bronchoscopy			
	• Non-teaching	174	17	+13[b]
	• Major Teaching	78	39	-9[b]
33208	Implant pacemaker dual chamber			
	• Non-teaching	210	44	+16[b]
Cardiovascular System Surgery				
35301	Carotid artery endarterectomy			
	• Non-teaching	385	99	+45[b]
	• Minor Teaching	192	71	+73[b]
	• Major Teaching	120	120	+24[b]
Urinary System Surgery				
50230	Radical nephrectomy			
	• Non-teaching	52	97	+125[a]
52320	Ureteroscopy and stone extraction			
	• Minor Teaching	242	15	+43[a]
52601	Transurethral resection prostate			
	• Non-teaching	164	39	+36[b]
	• Minor Teaching	291	34	+41[b]
	• Major Teaching	86	63	+12[b]
Female Genital System Surgery				
58150	Total abdominal hysterectomy			
	• Non-teaching	896	81	+39[b]
	• Minor Teaching	214	66	+54[b]
	• Major Teaching	725	113	+7[b]

(continued)

Table 4-3 (continued)
Comparison of Differences in Intra-Service Times Between Operative Log Data and RUC/Harvard Times, for Selected Surgical Procedures by Teaching Status, 2001-2005

Nervous System Surgery				
64721	Open carpal tunnel release			
	• Non-teaching	536	17	+8[b]
	• Minor Teaching	440	14	+11[b]
	• Major Teaching	106	29	-4[b]
Eye Surgery				
66984	Extracapsular cataract removal with insertion of intraocular lens			
	• Non-teaching	2,168	19	+11b
	• Minor Teaching	155	39	-9b
	• Major Teaching	626	21	+9b
Not in MPC List				
Musculoskeletal System Surgery				
27130	Total hip arthroplasty			
	• Non-teaching	497	91	+44[b]
	• Minor Teaching	187	88	+47[b]
	• Major Teaching	153	152	-17[b]
Digestive System Surgery				
47562	Laparoscopic cholecystectomy			
	• Non-teaching	2,508	49	+31[b]
	• Minor Teaching	670	48	+32[b]
	• Major Teaching	2,002	67	+13[b]
47563	Cholecystectomy with cholangiography			
	• Non-teaching	856	55	+88[a]
	• Minor Teaching	470	40	+103[a]
	• Major Teaching	164	73	+70[a]
Urinary System Surgery				
55840	Prostatectomy retropucid radical			
	• Non-teaching	99	114	+69[a]
Female Genital System Surgery				
58120	D & C			
	• Non-teaching	751	9	+16[b]
	• Minor Teaching	58	9	+16[b]
	• Major Teaching	950	14	+11[b]

NOTES:

[a] Difference based on Harvard times.

[b] Difference based on RUC times.

[c] The operative log data represent bilateral reduction mammoplasties. In our review of the operative logs' narrative descriptions, we observed virtually all reduction mammoplasties being performed as a bilateral procedure. Following CMS's payment policy of inflating payment by 50% when a bilateral procedure is performed, we inflated the RUC time estimates by 50% prior to comparison with operative log mean time estimates.

1 Statistical significance assessed using Wilcoxon Signed Rank Test. All differences are statistically significant at the $p<0.05$ level or better.

2 CPT codes with fewer than 100 operative logs for estimation of mean are excluded from this table.

SOURCE: CMS TIMEDATA file; DJ Sullivan operating room logs, 2001-2005

Table 4-4
Comparison of Differences in Intra-Service Times Between Operative Log Data and RUC/Harvard Times, for Selected Surgical Procedures by Number of OR Rooms, 2001-2005

CPT Code	CPT Description	Number of Observations	Operative Log Geometric Mean Time (Minutes)	Difference between RUC/Harvard Median Time and Operative Log Geometric Mean Time (Difference in minutes)
In MPC List				
Integumentary System Surgery				
19318[c]	Reduction mammoplasty			
	• Less than 8 (ORs)	121	163	+62[b]
	• 8-14	83	178	+47[b]
	• 15+	75	207	+18[b]
Musculoskeletal System Surgery				
27125	Hip hemiarthroplasty			
	• 8-14	71	68	+16[a]
	• 15+	124	77	+7[a]
29881	Knee arthroscopy/partial meniscectomy			
	• 15+	602	32	+34[a]
Respiratory System Surgery				
31622	Bronchoscopy			
	• Less than 8	110	15	+15[b]
	• 8-14	117	28	+2[b NS]
33208 - Implant pacemaker dual chamber				
	• Less than 8	83	40	+20[b]
	• 8-14	127	46	+14[b]
Cardiovascular System Surgery				
35301	Carotid artery endarterectomy			
	• Less than 8	448	83	+61[b]
	• 8-14	176	120	+24[b]
	• 15+	73	105	+39[b]
Urinary System Surgery				
50230	Radical nephrectomy			
	• 8-14	82	119	+103[a]
52320	Ureteroscopy and stone extraction			
	• 8-14	244	15	+43[a]
52601	Transurethral resection prostate			
	• Less than 8	185	48	+27[b]
	• 8-14	262	35	+40[b]
	• 15+	94	34	+41[b]
Female Genital System Surgery				
58150	Total abdominal hysterectomy			
	• Less than 8	731	82	+38[b]
	• 8-14	562	94	+26[b]
	• 15+	542	98	+22[b]

(continued)

Table 4-4 (continued)
Comparison of Differences in Intra-Service Times Between Operative Log Data and RUC/Harvard Times, for Selected Surgical Procedures by Number of OR Rooms, 2001-2005

Nervous System Surgery				
64721	Open carpal tunnel release			
	• Less than 8	684	15	+10[b]
	• 8-14	277	17	+8[b]
	• 15+	121	21	+4[b]
Eye Surgery				
66984	Extracapsular cataract removal with insertion of intraocular lens			
	• Less than 8	2,262	18	+12b
	• 8-14	166	52	-22b
	• 15+	521	23	+7b
Not in MPC List				
Musculoskeletal System Surgery				
27130	Total hip arthroplasty			
	• Less than 8	470	91	+44[b]
	• 8-14	221	117	+18[b]
	• 15+	146	102	+33[b]
Digestive System Surgery				
47562	Laparoscopic cholecystectomy			
	• Less than 8	2,131	47	+33[b]
	• 8-14	1,609	64	+16[b]
	• 15+	1,440	59	+21[b]
47563	Cholecystectomy with cholangiography			
	• Less than 8	342	52	+91[a]
	• 8-14	473	42	+101[a]
	• 15+	675	58	+85[a]
Urinary System Surgery				
55840	Prostatectomy retropucid radical			
	• 15+	84	124	+59[a]
Female Genital System Surgery				
58120	D & C			
	• Less than 8	446	11	+14[b]
	• 8-14	102	18	+7[b]
	• 15+	1,211	11	+14[b]

NOTES:

[a] Difference based on Harvard times.

[b] Difference based on RUC times.

[c] The operative log data represent bilateral reduction mammoplasties. In our review of the operative logs' narrative descriptions, we observed virtually all reduction mammoplasties being performed as a bilateral procedure. Following CMS's payment policy of inflating payment by 50% when a bilateral procedure is performed, we inflated the RUC time estimates by 50% prior to comparison with operative log mean time estimates.

1. Statistical significance assessed using Wilcoxon Signed Rank Test. All differences are statistically significant at the $p<0.05$ level or better.

2. CPT codes with fewer than 100 operative logs for estimation of mean are excluded from this table.

SOURCE: CMS TIMEDATA file; DJ Sullivan operating room logs, 2001-2005

Table 4-5
Comparison of Differences in Intra-Service Times in Operative Log Data between 1993/99 and 2001/05

CPT Code	CPT Description	1993-1999 Operative Log Geometric Mean Time (Minutes)	2001-2005 Operative Log Geometric Mean Time (Minutes)
In MPC List			
Integumentary System Surgery			
19318[c]	Reduction mammoplasty	60	24
Musculoskeletal System Surgery			
29881	Knee arthroscopy/partial meniscectomy	40	32
Respiratory System Surgery			
31622	Bronchoscopy	22	22
33208	Implant pacemaker dual chamber	63	44
Cardiovascular System Surgery			
35301	Carotid artery endarterectomy	103	93
Urinary System Surgery			
50230	Radical nephrectomy	149	130
52320	Ureteroscopy and stone extraction	17	15
Female Genital System Surgery			
58150	Total abdominal hysterectomy	99	90
Nervous System Surgery			
64721	Open carpal tunnel release	16	16
Eye Surgery			
66984	Extracapsular cataract removal with insertion of intraocular lens	31	20
Not in MPC List			
Musculoskeletal System Surgery			
27130	Total hip arthroplasty	101	99
Female Genital System Surgery			
58120	D & C	12	11

NOTES:

[a] Difference based on Harvard times.

[b] Difference based on RUC times.

[c] The operative log data represent bilateral reduction mammoplasties. In our review of the operative logs' narrative descriptions, we observed virtually all reduction mammoplasties being performed as a bilateral procedure. Following CMS's payment policy of inflating payment by 50% when a bilateral procedure is performed, we inflated the RUC time estimates by 50% prior to comparison with operative log mean time estimates.

1. Statistical significance assessed using Wilcoxon Signed Rank Test. All differences are statistically significant at the $p<0.05$ level or better.

2. CPT codes with fewer than 100 operative logs for estimation of mean are excluded from this table.

SOURCE: DJ Sullivan operating room logs, 1993-1999, 2001-2005.

4.5 Conclusion

In summary, the D.J. Sullivan Healthcare Consulting, Inc. (SHC) data provide a rich opportunity to compare operating room times based on objective log information with the RUC's survey-generated times. With few exceptions, we observe a pattern where the Harvard and RUC intra-service times are significantly longer than the geometric mean intra-service times from the operative logs. The pattern is observed, consistently, at the aggregate level and within classes of hospitals. Moreover, the patterns observed in this study mirror those observed in our prior study of intra-service surgical times. For the subset of procedures with operating room log data across years, we observe declining average times for three quarters of the procedures, declines that are consistent with declining times also reported by the RUC (see Section 6).

Combined, these findings suggest that the levels of intra-services times of major surgical procedures appear over-stated in the MFS. The over-valuation of time for surgical procedures in the MFS affects physician payments directly through its influence on work and practice expense RVUs and indirectly through its influence on the conversion factor. To the extent that previous work has shown a correlation between intra-service time and physician work, then the associated levels of work RVUs would appear to be overstated as well.

The intra-service times estimated from operating room log data span the years 2001 through 2005 and post-date the Harvard time estimates collected in the late 1980s and early 1990s. The shorter observed operative log times relative to the Harvard times may reflect a number of factors that generate efficiency gains and increased provider productivity in the operating room.

Differences in the operative log and the RUC estimates are not as easily explained given the concurrent period of data collection. The differences could be explained by the RUC's use of time estimates derived from select groups of non-representative physicians. A non-random sample of physicians in teaching hospitals who tend to care for patients with illnesses of greater than average severity would likely produce longer time estimates than those obtained from a nationally representative sample of physicians. These findings suggest that CMS' efforts to find objective, nationally representative, time data are critical to the long-run integrity of the Medicare Fee Schedule.

SECTION 5
GLOBAL SURGERY "HAND-OFFS" UNDER THE MEDICARE FEE SCHEDULE

5.1 Introduction

Over the last 5–8 years, Medicare spending on physician services has accelerated. This has created a growing public policy problem because of the implications for the MMA legislation that tied physician spending to a "sustainable growth rate" linked to the country's Gross Domestic Product. For several years, the Congress has had to override its SGR rules that would have required physician fee updates to be negative (roughly -4.5%) rather than positive, despite recognized increases in practice costs (MedPAC, 2005).

One of the healthcare cost drivers has been the increase in spending on physician E&M visits with patients. For example, the number of physician office visits and consultations grew by 66 million (21%) between 1997–1998 and 2002–2003, costing Medicare an extra $4.7 billion annually (Section 3, Table 3-5). The number of inpatient visits has also been growing as well, as shown later in this section. Surgical care has become more intensive with more and more specialists involved in a patient's care. Aging of the population, the adoption of new technologies, and physician specialization have all been contributing factors to increased intensity.

One counter to the growing trend is the global surgical package wherein most pre- and post-operative visits by the surgeon are included in a global fee. The exact number of type of visits to be included in the single fee was determined when the fee schedule was implemented by Medicare in 1992 (see Section 5.2 for details). The visit package has been updated by CMS since 1992 to account, primarily, for shorter hospital stays (as shown in Section 5.2.4). Yet, surgeons may be "handing-off" post-operative care to other specialists more than in the past while still being paid for follow-up visits in their global package. RTI's physician panel recommended that we investiage possible hand-offs as well.

5.1.1 Purposes of Global Surgery "Hand-Off" Study

The purposes of our study of "hand-offs" are fourfold.

1. To track how CMS has changed the number and type of visits included in the global package in response to shorter stays and re-engineering of the service.

2. To quantify the increase in Medicare spending on post-operative visits and how much of the increase is due simply to more visits versus a shift to higher level, more costly, visits.

3. To **distinguish** the kinds of visits and specialties most likely to be true hand-offs of post-surgery care **(i.e., those for usual post-operative care) from** care for unrelated conditions. **If surgeons are handing off conventional post-operative care while continuing to bill under the global fee, Medicare is making duplicate payments for those services.**

4. **How well does the Global Surgery model and the available billing options (modifiers 54 and 55, permitting an all-or-none choice of bundling post-operative care with the surgery) reflect the range of practice in contemporary surgery.**

The first two goals are relatively straightforward, but trying to distinguish related from unrelated care is far more difficult. Unfortunately for our research purposes, surgeons do not bill separately for usual care in the global period related to the surgery. A definitive study of the services that surgeons provide would require detailed chart review of adequate numbers of clinical records. Using claims data, we cannot measure any declines in surgeon visits that might be occurring. We can, however, track increases in post-operative visits by other physicians that are paid for by Medicare and make an effort to draw inferences about the "unmeasured" change in services provided by the surgeon during the global period.

5.1.2 Coding Conventions Regarding Surgery and Research Methods

Medicare's Claims & Adjudication manual (1996) provides 23 pages of instructions to carriers in how to pay (or not) for post-operative visits. Besides including a pre-operative visit after the decision for surgery, CMS has **established** the number of follow-up inpatient and ambulatory office visits that belong in the package**; such services must not** be billed separately by the performing surgeon. If the surgeon **formally** "hands off" the post-operative visit related to recovery, this is called a transfer**;** both the surgeon and **the** physician **to whom the patient is being transferred** are required to use appropriate modifiers. A seemingly straightforward process is greatly complicated by language in the manual excluding visits *unrelated* to the diagnosis for which the procedure was performed. Physicians, including the surgeon, may bill for post-operative visits in the global window ***without using modifiers*** when they are caring for an underlying condition or medical complication unrelated to the surgery itself. The manual cites a cardiologist who manages an underlying cardiovascular condition of a patient in the ICU, step-down unit, or in the office as an example of a billable service.

Allowing physicians to bill for "unrelated" care within the global period renders the concept of surgeon responsibility for follow-up management almost meaningless in today's world of specialized medicine—especially for Medicare patients who frequently have "underlying medical conditions and complications" in the post-surgical period. Rarely, for example, do cardiologists and intensivists in the ICU bill under the exact same diagnosis as the surgeon. Our investigation of claims for several surgical procedures often showed slight variations in the 5-digit ICD9 diagnosis code used by the surgeon and the follow-up physician. It is almost impossible for carriers to deny claims for such visits when, in fact, another physician has also taken over the monitoring of the patient's general recovery. As specialization increases, so does the involvement of both medical consultants and primary care physicians who follow the patient's progress, often in locales quite remote from the site of surgery.

Based on our expert panel recommendations, we identified 32 major surgical procedures in seven broad areas for focused study of hand-offs and growth in the number of post-operative visits. If related "hand-offs" are increasing over time, the number of allowed post-operative visits should be scaled back in the global package. CMS appears to be doing this as part of the 5-year reviews, but only to a limited extent.

To isolate related follow-up visits, we identified a set of six specialties most likely to be monitoring patient recovery after surgery (critical care intensivists, internal medicine, family practice, general surgery, nurse practitioners and physician assistants) and have designated them as "hand-off specialties". We also identified four types of visits as hand-off oriented, i.e. less likely to be for problems unrelated to the surgery: new and established office visits, critical care, and subsequent hospital visits—all provided by other than the performing surgeon.

5.1.3 Summary of Key Findings

5.1.3.1 Changes in Definitions of Global Packages made by CMS

We found that 16-of-28 of our study surgical codes for which we had data had had their total post-operative visits and times reduced by CMS—several by one-third or more. Hospital visit counts generally fell due to shorter inpatient stays (e.g., total knee replacement saw a halving of included inpatient visits). A major factor driving down total expected visit times was reductions in time-consuming ICU visits, usually from two **days to one**. These reductions are not due to shorter stays but to re-engineering of the service within the hospital to save on costly ICU resources. Interestingly, CMS payment rules have permitted substantial upcoding of follow-up hospital visits from CPT code 99231, the basic inpatient follow-up visit. Fewer 99231 visits have been partially off set by more complex visits during the stay. CMS has not increased the number of allowable follow-up office visits to any appreciable degree.

5.1.3.2 Sources of Increase in Medicare Spending on Post-operative Visits

While CMS has been reducing the number of surgeon visits included in the surgical package **(1996 through 2006)**, visits per beneficiary by other physicians during the global period increased by 16% on average across the eight broad surgery groups and 21% for heart surgery. This may indicate fewer follow-up visits by surgeons than included in the surgical package. Yet, other physicians are also billing for follow-up visits at the same time that surgeons are supposedly seeing the patient for hundreds of minutes in the global package "at the bedside" as well.

Primarily, w**e** were interested in the factors driving Medicare outlays for post-operative visits mostly for major surgery. In our seven surgical groups, allowed Medicare post-op visit charges (i.e., payments) increased 53% per beneficiary (i.e., patient) between 1995 and 2004. We estimate that a transition blending of 50-50% in 1995 accounted for 3.4 percentage points (out of 53). During the same period, the conversion factor increased only 2.7%, explaining very little of the payment increase. (Larger adjustments for inflation have been offset by negative adjustments by Congress for excessive volume growth.) Simple counts of post-operative visits per beneficiary increased 16%, explaining about one-third of the allowable charge increase. Total visit RVUs, including work and practice and malpractice expenses, increased 25% on a per visit basis without blending. On a per beneficiary basis, total visit RVUs increased 46%, or three times the rate of visit growth. Increases of this magnitude imply considerably greater intensity of services per visit, either by physicians or their practice support staff.

How much of the increased RVU intensity per visit and allowed visit charges can be accounted for by CMS-approved increases in work and other RVUs or to shifts in visit mix?

CMS-approved increases in work RVUs between 1995 and 2004 accounted for slightly less than 20 percentage points of the 53% increase in allowed charges. Changes in practice and malpractice expenses RVUs were actually negative, thereby reducing allowed charges by about 12 percentage points. If visit mix had not changed between 1995 and 2004, the net effect of CMS-determined RVU increases and decreases would have been roughly 7 percentage points out of 53 points. The effect of changes in visit mix is confounded with the general growth in visits that partially offset each other in driving growth in RVUs per visit. The shift in post-operative visits to higher RVU codes varied widely across the seven surgery groups, led by orthopedic, hip, and knee replacements with over an 84% increase in RVU-weighted visits. This effect was offset, however, by a near 70% increase in total visits. On net, the shift in visit mix contributed about 14 percentage points to growth in RVU-weighted visits for total hip and knee procedures. Vascular and prostate surgery actually experienced declining RVUs per visit and a downward shift in visit mix. In general, though, a strong trend exists in physicians billing for more and for higher valued, more resource-intensive post-operative visits.

Increased **levels of E/M services** could be attributable to greater patient severity. However, while study patients may have more comorbid illnesses in 2004 than in 1995, **our** examination of the age, gender, and racial mix of patients undergoing the surgeries **reveals that these characteristics** had not changed **significantly.** This may seem counter-intuitive**,** given the aging of the Medicare population**,** but is explained by the way the sample was constructed. Patients undergoing one of the 32 major surgeries in 1995 or 2004 were included using Medicare's 5% beneficiary files. It is unlikely that the sampled patients in 1995 also had another major study operation in 2004, and Medicare replenishes deaths in the claims files with new, randomly sampled, beneficiaries each year. Nevertheless, it is likely that the strong growth in visit mix to more RVU-intensive codes is partly due to more comorbid conditions in the elderly population.

5.1.3.3 Growing Hand-offs for Post-operative Care

Our expert panelists tell us that the care of surgical patients has seen major changes since the late 1980's when the global surgery package was codified. We believe that surgeons have increased their productivity and efficiency through the development of surgical teams (personnel substitution) and re-engineering (including post-operative care by intensivists and other physician specialists). The lack of significant use of the relevant modifiers 54 and 55 for surgery-only and post-operative care-only indicates that surgeons continue to bill using codes for the global package in spite of these changes.

Two groups of "hand-off" professionals, physician assistants (PAs) and nurse practitioners (NPs), are of particular interest, for they must provide their services under the supervision of a physician. Performing such tasks as wound care, dressing changes, irrigation and drainage or the changing of plaster casts, for which they are specifically trained, PAs and NPs would appear to be primarily, if not exclusively, occupied in providing the usual post-operative services.

Allowed charges and total RVUs per patient billed by "hand-off specialists increased by 71% and 66%, respectively, in 2004 compared with 1995. Numbers of visits and total RVUs per visit increased more rapidly for the "hand-off" specialties than for

other specialties as well. Increases in visits per patient among the six hand-off specialties across the seven surgical groups ranged from zero for neurosurgery to 45% for heart surgery. These increases were much greater on an RVU basis because of CMS-approved increases in visit work effort.

Allowed charges by NPs and PA's have increased dramatically, albeit from a low base, rising by more than 460-fold and 46-fold respectively for orthopedic surgery. Numbers of visits and total RVUs per patient by PAs and NPs have increased over the ten-year span by similar orders of magnitude. We see dramatic increases in post-operative charges by PAs and NPs in cardiac surgery, aortic aneurysm surgery and colorectal surgery as well. This would appear to be a case of personnel substitution by the principal surgeons. While the absolute magnitude of the RVUs and charges in 2004 are still small relative to total RVUs and charges, the appearance of separate charges by NPs and PAs is noteworthy in itself. Post-operative services by these non-physicians may be an indicator of a broader substitution by physicians other than the principal surgeon in performance of usual post-operative care.

Taken on their own terms, these billings by NPs and PAs raise additional questions. For what services are these bills rendered, if not for usual post-operative care that is within the professional expertise of these providers? Secondly, are these individuals billing as independent fee-for-service practitioners or as salaried employees of surgical practices? For if they are salaried employees, a common arrangement in surgical practices, their costs are already reimbursed under the practice expense RVUs for the global package. Does separate billing of their services mean that Medicare is making duplicate payments, once fees for their services and again as practice expenses, based on their salaries and necessary overhead, allocated to the global surgical fee. These questions cannot be answered by the data available, but would appear to merit additional investigation by appropriate means.

5.1.3.4 Appropriateness of the Global Surgical Package Model in the Context of Changing Practices

It seems fair to ask the question of whether the construct of the global surgical package is appropriate given the changes in practice over more than 20 years since its codification under Medicare's Physician Payment Reform (Omnibus Budget Reconciliation Act of 1989). Have the processes of increased productivity—including re-engineering, personnel substitution, and surgery at a distance from the patient's home—made the global package a poor model of contemporary surgery and its resource costs? At a minimum, it appears that the current options surgeons have in billing are not reflective of the variation within current practice. Much of what occurs in American surgery probably lies somewhere between the surgeons' performing only the surgical procedure and their providing the entire global package. Unbundling the global package and moving to documentation, coding, and billing for each service separately would provide a more transparent and efficient way of paying for surgical care. Tests of such a payment model, perhaps in selected administrative areas, could determine the feasibility of a change of this sort?

5.1.4 Organization of Section

The rest of this section is organized as follows. First, we review the rules and regulations regarding Medicare's definition of the global package in Section 5.2. This section also includes the use of surgical modifiers that guide Medicare payment in special situations such as official transfers (hand-offs) of patient care. In this section, we also track changes in the number and kinds of visits that Medicare includes in the package. Section 5.3 summarizes our data sources for the study of hand-offs, the surgeries identified for special study and their sample sizes, and the types of post-operative visits studied. The section also describes how we decomposed Medicare spending on post-operative visits and isolate related versus unrelated hand-offs. Section 5.4 presents our comparisons of changes in Medicare outlays and numbers of post-operative visits.

5.2 Medicare Rules & Regulations Regarding Post-Surgery Visits

5.2.1 Technical Background

When the Harvard research group developed estimates of physician work in the early 1990s, they included separate estimates of both pre- and post-service work (Hsaio *et al.*, 1992). For these E&M services, physician panelists were asked to report times and work effort for four post-surgery visit groups: same day visit; ICU post-surgery visits; other hospital post-surgery visits; and office visits. Total post-surgery work was based on the product of total time and work per unit time (WPUT). WPUT was found to vary significantly across the four types of visits. Total time was eventually represented by hospital and office visit counts of various types weighted by their average times. For example, a hip replacement global package (CPT 27130) allowed for one discharge management visit (99238) at 20 minutes, eight "low complexity" subsequent hospital visits (99231) at 15 minutes each, plus 3.5 straightforward, problem-focused office visits (99212) at 10 minutes each. The total is 185 post-surgery follow-up minutes.

Under the Medicare program, a single fee is paid for all necessary services provided by the surgeon before, during, and after the surgery. CMS felt that standardization of the global surgical period was critical to ensure equity in payment. Prior to implementation of the MFS, there was wide variation across the Medicare carriers in their definition of the global period. The work RVUs were developed to reflect Medicare's global surgical periods.

To aid in defining meaningful global surgical periods, separate payment "windows" were established for major surgery, minor surgery, and non-incisional procedures. The pre-operative period for major surgery starts on the day before surgery and includes all visits, in or out of the hospital. The post-operative period is 90 days for major surgeries.[13] The "window" starts over when a new surgery is performed.

[13] For minor surgeries, no evaluation and management services related to the surgery are reimbursed on the day of the surgery. Minor surgical procedures have varying post-operative window periods ranging from zero to ten days. The post-operative periods cover all services by the surgeon related to the diagnosis. For endoscopies, no payment for visits is allowed on the same day of the procedure.

5.2.2 Content of the Global Surgical Package

The CMS Claims & Adjudication Procedures manual devotes 23 pages (Sections 4820–29) to defining, operationally, what is or is not included in the global surgical package and how surgeons and other physicians should bill for post-surgical care. The following paraphrases the instructions for both the surgery and follow-up care, although our focus will be on post-operative visits:

Components included in a global surgery package

- Pre-operative visits beginning with day before surgery
- Intra-operative procedures
- Complications following surgery not requiring return to operating room
- Post-operative visits related to recovery from surgery
- Post-operative pain management by surgeon
- Supplies: dressing changes; local incision care; and removal of operative packs, staples, sutures, casts, splints, tubes, drains; urinary catheters and intravenous lines.

A small number of pre-operative visits and several post-operative visits are included in the package with no separate payment to the surgeon. The surgeon also cannot bill for caring for complications that do not require a return to the operating room.

Services not included in a global package

- Initial consultation by surgeon for need for surgery
- Services of other physicians except for *transfer* of patient from surgeon to another physician
- Visits *unrelated* to diagnosis for which surgical procedure was performed unless visits due to surgical complications
- Treatment for underlying condition which is not part of normal recovery from surgery
- Diagnostic tests
- Distinct surgical procedures during the post-operative period which are not reoperations or treatment for complications. A new post-operative period begins with a new procedure
- Return to operating room, diagnostic catheter lab, laser suite, or endoscopy suite for complications
- More extensive procedure if less extensive one fails

- Immunosuppressive therapy for organ transplants

- Critical (ICU) care *unrelated* to the surgery.

Two words are key to the exclusions and must be clearly understood. First, a "transfer" is a technical term meaning the formal hand-off of the patient to another physician. Transfers require documentation and involve the use of billing modifiers, as discussed below. However, the transfer only applies to follow-up care by a second physician that is specifically related to monitoring the patient's progress from the surgery. If another physician cares for medical problems not specifically related to the surgery, then his/her visits are outside the global package and can be reimbursed.

In addition to these inclusions and exclusions, other Medicare billing instructions to the carriers are relevant:

Billing Instructions for a global surgical package

- Where *transfer* to another MD does not occur, another physician may be paid or not depending on circumstances.

- When more than one physician provides services included in a global surgical package, the sum total approved for all physicians may not exceed what would have been paid to surgeon alone unless surgeon performs only the surgery.

- Physicians other than surgeon required in post-operative period to care for an underlying condition or medical complication should use the appropriate E&M code without modifiers. An example is a cardiologist who manages underlying cardiovascular conditions of a patient.

- When returning to the operating room for complications, any surgeries are paid only for the intra-operative portion.

- Two equal co-surgeons, when necessary, bill separately and fully for the procedure.

The essence of the billing instructions is that practically all other specialists brought in on a case after surgery are entitled to bill and be paid by Medicare. The cardiologist who follows the patient after hospitalization is generally assumed not to be monitoring the patient's recovery from surgery, nor is the pulmonologist, the intensivist, or other specialist. Thus, most Medicare surgical patients show a 90-day claims trail with a substantial number of paid claims from all variety of specialists (and very few, if any, visit bills from the primary surgeon for unrelated care). The limit of all bills to the total to be paid to the surgeon generally does not apply because other specialists are providing care "outside the surgical package."

5.2.3 Surgical Modifiers

A voluminous set of rules defining global packages and payment is executed by carriers through an extensive set of billing modifiers. Physicians use these modifiers to justify payment and to explain the scope of services they are billing for. The CPT and HCPCS manuals include

nearly 30 different modifiers. Several are not relevant to billing the global package, such as unusual procedural or anesthesia services (modifiers 22 and 23) or mandated service by third party payor (32). Some are specific to the surgery, such as reduced service, i.e., aborted surgery (52), bilateral surgery (50) and professional component, i.e., interpreting a test (26). Many are germane in billing correctly for post-operative visits, such as

(24) Unrelated E&M visit by same physician in post-operative period
(25) E&M visit by same physician on day of surgery beyond usual post-operative care
(54) Surgical care only
(55) Post-operative management only
(79) Unrelated procedure or service during post-operative period.

Surgeons can bill for post-surgical visits within the 90-day window if the reason for the visit is unrelated to the previous surgery. If a surgeon was only performing the surgery then transferring the post-surgery follow-up to another physician, an "official" hand-off, then the surgeon should use modifier 54. This would result in a diminished payment assuming that the follow-up visits will be paid to another physician. The physician receiving the transfer hand-off should also use modifier 55 when billing for a visit. If the surgeon typically handed-off patients to other physicians to monitor their progress, then modifier 54 would be used extensively. In our global surgery analysis, we found that surgeons practically never used modifier 54. Code 79 is used, but only occasionally, by other physicians who treat the patient for an unrelated condition. Often, physicians seeing patients post-operatively outside of the hospital are unaware that they are submitting bills within a 90-day global period and, hence, do not use modifier 79. Generally, their bills are paid by the carrier anyway based on an "unrelated" diagnosis. If the surgeon needs to return to the operating room to fix a problem with the surgery, modifier 78 should be used.

Carriers are required to have software that properly accounts for all of the modifiers and screens describing the global package. This can amount to thousands of lines of code. Dealing with hand-offs is probably one of the most difficult challenges facing Medicare carriers. Denying payment to non-surgeons during the 90-day global window is rarely done. Besides the inequity of not allowing other physicians to bill for their post-operative visits, especially if the surgeon is not following the patient, there is the practical concern facing carriers who receive bills during and well after a patient's 90-day window. Denying payment would require a precise determination of the reason for visit, very few of which would be strictly related to the surgery, such as wound infection. Even then, an infectious disease physician would be allowed to bill outside of the global package. Also, visits beyond the number included in the package would be ineligible for payment, which, again, would be a challenge to track by carriers.

5.2.4 Changes in the Allowed Number and Type of Post-Operative Visits

The Harvard research group and CMS originally determined the number and resource content of post-operative hospital and office visits 15 years ago. Many of the surgical procedures have been updated since then, either through the annual CMS interim process or through one of three 5-year reviews that have taken place. This should have the effect of reducing the surgeon's total time involved in the package and total work RVUs may decline as well if pre- and intra-operative work remain unchanged. Part of the analysis is to track changes that have been made to

post-operative visits since the MFS was implemented and how they conform to changing practice patterns, such as shorter hospitalizations.

Table 5-1 summarizes changes that have been made in the number and distribution of post-operative visits in the global surgical package for 26 of our study codes (explained in 5.3.2) with data for both 1999 and 2006 in CMS' TIMEDATA file. (We did not have visit counts for 1995 or 2004 that would correspond with our analytic time frame.) Total post-visit time is based on a weighted average of recommended visit counts with the weights being suggested E&M times in the CPT manual. We imputed 60 and 40 minutes for critical care ICU32 and ICU33, respectively.[14] Sixteen of the 26 surgical codes (about 6-in-10) had net reductions in their post-operative visit times between 1999 and 2006. Code 61312 (Open skull for drainage) had a 50% reduction in total visit times, primarily because all six critical care visits were eliminated, partly in favor of more routine hospital visits. Several codes had their total visit times reduced by one-third or more (e.g., 33545: Repair of heart damage) due to fewer expected post-operative visits.

Seven codes had their post-operative times increased, led by two codes with about 50% increases (44120: Removal of small intestine; 47600: Removal of Gallbladder). This is the result of a shift in visit counts from E&M 99231 with the lowest hospital visit time to more complex, time-consuming, hospital codes.

Hospital visit counts are generally falling because of shorter hospital stays. Shorter stays are a common justification for the RUC and CMS to reduce total follow-up physician visits and work RVUs (Fed. Register, 2006, p. 37224, cardiac surgery). See also McCall *et al.* (2001, chapter 4), who analyzed the link between length of stay and expected post-operative visits. For example, code 27447 (Total knee replacement), had a 27% reduction in total post-operative visit times because of a halving of the number of hospital visits. Total allowed post-operative visit times (and corresponding payments) are quite sensitive to the number of critical care visits. All of our study surgery codes with 1999 critical care visits had reductions in the number of such visits in the global package by 2006. Assuming critical care visits occur most often immediately after surgery, fewer of these visits do not seem to be due to quicker discharges. In adjusting for shorter inpatient stays, it does not appear from Table 5-1 that the RUC and CMS have increased the number of office visits to any degree.

[14] ICU32=99291 covers the first 30-74 minutes, while ICU33=99292 is more every additional 30 minutes.

Table 5-1
Changes in Post-Operative Office and Hospital Visits Included in CMS' Global Surgery Package, by Surgery Group and HCPCS: 1999 and 2006

				Office Visits						Hospital Visits									
Year	Source	HCPS Code	Description	99211	99212	99213	99214	99215	*Total Visit Count*	99231	99232	99233	99238	99239	ICU32	ICU33	*Total Visit Count*	Total Post-Op Time[a]	Post-Op % Change Time
1999	HRV	27130	Total Hip Replacement		3.5				***3.5***	8.0			1.0				***9.0***	**185.0**	
2006	RUC	27130			1.0	3.0			***4.0***	3.0	1.0		1.0				***5.0***	**155.0**	-16%
1999	HRV	27447	Total Knee Replacement			4.0			***4.0***	9.0			1.0				***10.0***	**225.0**	
2006	RUC	27447			1.0	2.0	1.0		***4.0***	3.0	1.0		1.0				***5.0***	**165.0**	-27%
1999	HRV	29881	Knee Arthroscopy			3.0			***3.0***								***0.0***	**45.0**	
2006	HRV	29881				3.0			***3.0***								***0.0***	**45.0**	0%
1999	HRV	33405	Aortic Valve Replacement				1.5		***1.5***	9.0			1.0		3.0		***13.0***	**382.5**	
2006	RUC	33405				1.0	1.0		***2.0***	1.0	2.0	3.0	1.0		1.0		***8.0***	**300.0**	-22%
1999	RUC	33425	Mitral Valvuloplasty			2.0			***2.0***	5.0			1.0		2.0		***8.0***	**255.0**	
2006	RUC	33425				1.0	1.0		***2.0***	1.0	2.0	4.0	1.0		1.0		***9.0***	**335.0**	31%
1999	HRV	33430	Mitral Valve Replacement				1.5		***1.5***	8.0			1.0		3.0		***12.0***	**367.5**	
2006	RUC	33430				2.0	1.0		***3.0***	1.0	2.0	3.0		1.0	2.0		***9.0***	**385.0**	5%
1999	HRV	33510	CABG, 1 vein				1.5		***1.5***	8.0			1.0		2.0		***11.0***	**307.5**	
2006	RUC	33510			1.0		1.0		***2.0***	1.0	2.0	3.0	1.0		1.0		***8.0***	**295.0**	-4%
1999	HRV	33511	CABG, 2 vein				1.5		***1.5***	8.0			1.0		2.0		***11.0***	**307.5**	
2006	RUC	33511			1.0		1.0		***2.0***	1.0	2.0	3.0	1.0		1.0		***8.0***	**295.0**	-4%
1999	HRV	33512	CABG, 3 vein				1.5		***1.5***	8.0			1.0		2.0		***11.0***	**307.5**	
2006	RUC	33512			1.0		1.0		***2.0***	1.0	2.0	4.0	1.0		1.0		***9.0***	**330.0**	7%
1999	HRV	33513	CABG, 4 vein				1.5		***1.5***	8.0			1.0		2.0		***11.0***	**307.5**	
2006	RUC	33513			1.0		1.0		***2.0***	1.0	2.0	4.0	1.0		1.0		***9.0***	**330.0**	7%
1999	HRV	33514	CABG, 5 vein				1.5		***1.5***	8.5			1.0		2.0		***11.5***	**315.0**	
2006	RUC	33514			1.0		1.0		***2.0***	1.0	2.0	4.0	1.0		1.0		***9.0***	**330.0**	5%
1999	HRV	33516	CABG, 6 vein				1.5		***1.5***	8.5			1.0		2.5		***12.0***	**345.0**	
2006	RUC	33516			1.0		1.0		***2.0***	1.0	2.0	4.0	1.0		1.0		***9.0***	**330.0**	-4%
1999	OTH	33533	CABG,1 arterial						***N/A***								***NA***	**NA**	
2006	RUC	33533			1.0		1.0		***2.0***	1.0	1.0	3.0	1.0		1.0		***7.0***	**270.0**	NA

(continued)

Table 5-1 (continued)
Changes in Post-Operative Office and Hospital Visits Included in CMS' Global Surgery Package, by Surgery Group and HCPCS: 1999 and 2006

				Office Visits						Hospital Visits									
Year	Source	HCPS Code	Description	99211	99212	99213	99214	99215	*Total Visit Count*	99231	99232	99233	99238	99239	ICU32	ICU33	*Total Visit Count*	Total Post-Op Time[a]	Post-Op % Change Time
1999	OTH	33534	CABG,2 arterial						***NA***								***NA***	**NA**	
2006	RUC	33534			1.0		1.0		***2.0***	1.0	1.0	3.0	1.0		1.0		***7.0***	**270.0**	NA
1999	OTH	33535	CABG,3 arterial						***NA***								***NA***	**NA**	
2006	RUC	33535			1.0		1.0		***2.0***	1.0	1.0	3.0	1.0		1.0		***7.0***	**270.0**	NA
1999	OTH	33536	CABG,4 arterial						***NA***								***NA***	**NA**	
2006	RUC	33536			1.0		1.0		***2.0***	1.0	1.0	3.0	1.0		1.0		***7.0***	**270.0**	NA
1999	HRV	33542	Myocardial resection				1.5		***1.5***	8.0			1.0		4.5		***13.5***	**457.5**	
2006	RUC	33542				1.0	1.0		***2.0***	1.0	2.0	3.0	1.0		2.0		***9.0***	**360.0**	-21%
1999	HRV	33545	Repair of Septal Defect				1.5		***1.5***	8.0			1.0		7.5		***16.5***	**637.5**	
2006	RUC	33545				1.0	1.0		***2.0***	1.0	1.0	4.0		1.0	2.0	1.0	***10.0***	**410.0**	-36%
1999	RUC	35081	Abdominal Aortic Aneurysm			1.0	1.0		***2.0***	6.0			1.0		3.0		***10.0***	**340.0**	
2006	RUC	35081			1.0	1.0	1.0		***3.0***	1.0	3.0		1.0		1.0		***6.0***	**230.0**	-32%
1999	HRV	44120	Removal, Small Intestine		3.0				***3.0***	7.5			1.0				***8.5***	**172.5**	
2006	RUC	44120			1.0	1.0			***2.0***	4.0	3.0	2.0	1.0				***10.0***	**260.0**	51%
1999	RUC	44140	Partial Removal of Colon		1.0		2.0		***3.0***	5.0	1.0		1.0				***7.0***	**190.0**	
2006	RUC	44140			1.0	2.0			***3.0***	5.0	1.0		1.0				***7.0***	**170.0**	-11%
1999	HRV	44150	Total Removal of Colon			4.5			***4.5***	10.0			1.0				***11.0***	**247.5**	
2006	RUC	44150			2.0	1.0	1.0		***4.0***	3.0	3.0	1.0	1.0				***8.0***	**245.0**	-1%
1999	HRV	44160	Partial Removal of Colon, ileum			4.0			***4.0***	9.0			1.0				***10.0***	**225.0**	
2006	RUC	44160			2.0	1.0			***3.0***	2.0	2.0	2.0	1.0				***7.0***	**215.0**	-4%
1999	HRV	47600	Removal of Gallbladder		2.5				***2.5***	3.0			1.0				***4.0***	**100.0**	
2006	RUC	47600			1.0	2.0			***3.0***	1.0	1.0	1.0	1.0				***4.0***	**145.0**	45%
1999	HRV	55845	Removal prostate, radical			3.0			***3.0***	10.0			1.0				***11.0***	**225.0**	
2006	HRV	55845				3.0			***3.0***	10.0			1.0				***11.0***	**225.0**	0%

(continued)

Table 5-1 (continued)
Changes in Post-Operative Office and Hospital Visits Included in CMS' Global Surgery Package, by Surgery Group and HCPCS: 1999 and 2006

				Office Visits						Hospital Visits									
Year	Source	HCPS Code	Description	99211	99212	99213	99214	99215	*Total Visit Count*	99231	99232	99233	99238	99239	ICU32	ICU33	*Total Visit Count*	Total Post-Op Time[a]	Post-Op % Change Time
1999	RUC	58200	Total Hysterectomy				2.0		***2.0***	3.0	1.0		1.0		1.0		***6.0***	**210.0**	
2006	RUC	58200				2.0			***2.0***	2.0	2.0		1.0				***5.0***	**140.0**	-33%
1999	RUC	58210	Radical Hysterectomy			3.0			***3.0***	5.0			1.0		1.0		***7.0***	**210.0**	
2006	RUC	58210				3.0			***3.0***	4.0	2.0		1.0				***7.0***	**185.0**	-12%
1999	RUC	61312	Craniectomy, supra			4.0			***4.0***	8.0			1.0		6.0		***15.0***	**570.0**	
2006	RUC	61312				2.0			***2.0***	6.0	4.0	1.0	1.0				***12.0***	**285.0**	-50%
1999	HRV	61314	Craniectomy, infra			2.5			***2.5***	7.5			1.0				***8.5***	**180.0**	
2006	HRV	61314				2.5			***2.5***	7.5			1.0				***8.5***	**180.0**	0%
1999	HRV	61510	Removal of Brain Lesion			4.0			***4.0***	4.0			1.0		3.0		***8.0***	**330.0**	
2006	RUC	61510				4.0			***4.0***	4.0	2.0		1.0				***7.0***	**200.0**	-39%

NOTES:

No data for lap cholecystectomy codes 47462, 47463, and 47464 for 2006

[a] Total time based on sum of visit counts weighted by CPT guideline visit face-to-face times with physician.

SOURCE: CMS TIMEDATA file.

5.3 Data Sources & Methods

5.3.1 Data Sources

The major data sources for the study of "hand-offs" are the 1995 and 2004 Medicare 5% Part B physician supplier claims files. These files contain all physician claims for a rolling random sample of Medicare beneficiaries. The initial 5% sample was a 1-in-20 random sample of beneficiaries prior to 1995. As beneficiaries die or lose eligibility, a random sample of new beneficiaries assures a 5% overall sample is subsequent years. Many beneficiaries will have several years of Medicare claims.

Data items on the 5% sample in both years include the following:

- Beneficiary ID
- Beneficiary sex, age, race
- Date of physician service
- Physician (and other Part B provider) specialty (roughly 70 categories)
- Service type (medical, surgical, radiology, assistant surgeon, etc.)
- HCPCS code
- Modifier code (2)
- Allowed charge and program payment
- Place of service (office, hospital, SNF, outpatient, ambulatory surgery center, etc.)
- Service count (number of visits bundled on a claim)
- Patient diagnosis for service
- Providing physician UPIN identifier

Separate analytic files were constructed for 1995 and 2004 given the new variables added since 1995. Claims with dates over 90 days beyond the date of a patient's first study surgery were deleted. This produced a maximum 90-day post-surgery follow-up "window."

Conversion factors used to convert allowed charges to RVUs were taken from the 1995 and 2004 MFS Final Rules found in the Federal Register (see Section 5.3.5).

5.3.2 Study Surgeries

Our expert physician panel recommended 35 HCPCS surgery codes that have undergone substantial productivity gains over the last decade. These surgeries also have experienced

significant re-engineering and site-of-care changes with shorter hospital stays. We grouped the panel's recommendations into seven related surgical groups as follows:[15]

Orthopedic Surgery (ORTHOPEDIC)

- Total knee replacement (27447)
- Total hip replacement (27130)
- Knee arthroscopy/surgery (29881)

Cardiac, Thoracic Surgery (CABGVALVE)

- Mitral/Aortic Valve Repair/Replacement (33405; 33425; 33430)
- All arterial/vein CABGs (33510-16, 33533-336)
- Myocardical Resection (33542)
- Repair Ventricular Septal Defect (33545)

Vascular Surgery (AAA)

- AAA (35081)

General, Colorectal, Oncology Surgery (COLORECTAL)

- Removal of small intestine (44120)
- Partial, total removal of colon (44140/45/50/60)
- Removal of gall bladder (47600)
- Laparoscopic cholecystectomy (56340)

Urology Surgery (PROSTATE)

- Extensive prostate surgery (55845)

OB-GYN (HYSTERECTOMY)

- Total, radical hysterectomy (58200, 58210)

Neurosurgery (NEURSURGERY)

- Removal of brain lesion (61510)
- Open skull for drainage (61312)

Most of the codes did not experience changes in definitions between 1995 and 2004. Laparoscopic cholecystectomies were not reported separately from regular cholecystectomies in 1995 (CPT codes 56340–42). In 2004, laparoscopic cholecystectomies were coded as 47562–64. The seven surgery groups were used as stratifiers in the analysis. No analysis was conducted of individual HPCPS surgery codes because of small sample sizes for some codes, only among broad groups as a whole. We also assumed that the hand-off responsibilities varied only in minor ways within group. It is possible that differential growth rates among surgeries within a few broad surgery groups might explain some of the spending and utilization differences over time.

[15] We initially analyzed cataract surgery as well, but its post-operative global period was too different to include with the other major surgeries, as practically none of its post-operative care is for eye surgery.

The final sample of patients included in a surgery group by year was based on a patient's first study HCPCS surgery code during 1995 or 2004 (***Table 5-2***).

Table 5-2
Sample Sizes for Eight Global Surgery Groups

Surgery Group	Sample Size	
	1995	2004
Orthopedic	11,701	18,057
Cardiovascular	8,881	7,937
Vascular (AAA)[a]	638	333
Colorectal	12,325	13,898
Prostate	835	518
Hysterectomy	209	249
Neurosurgery	502	671

NOTES:

[a]AAA: abdominal aortic aneurysm.

SOURCE: 1995 and 2004 Medicare 5% Physician/Supplier claims files; partb95_04_n

Patients with two or more study surgeries during the 90-day window were excluded. Study patients undergoing another non-study surgery remained in the analytic sample because we were not able to distinguish completely related from unrelated readmissions.

5.3.3 Selection of Post-Operative Visits

Post-operative visits possibly related to hand-offs or follow-up physician care were grouped into 10 categories:

Type of Visit	HCPCS Code
New Office Visits:	99201–99205
Established Office Visits:	99211–99215
Initial Hospital Observation:	99217–99220
Initial Hospital Visits:	99221–99223
Subsequent Hospital Visits:	99231–99238
Office Consults:	99241–99245
Initial Hospital Consults:	99250–99255
Follow-Up Hospital Consults:	99261–99253
Confirmatory Consults:	99271–99275
Critical (ICU) Care Visits:	99291, 99292

Several visit types were excluded from the analysis, including SNF, home, and hospice, because they were of less relevance to physician follow-up from surgery. Visits without a positive allowed charge were excluded (mostly duplicative claims) along with paid visits by the

performing surgeon (very few). Performing surgeon post-operative visits were excluded given our goal of measuring the change over time in visit hand-offs to other physicians.

Two windows were used in tracking post-operative visits: 90 days and 30 days. It was not feasible (except for other study surgeries) to selectively delete ambulatory or inpatient visits that were unrelated to the study surgery, and the final analytic file includes study patients who were treated for other acute and chronic conditions. A 30-day window should factor out a significant percentage of unrelated visits.

5.3.4 Isolating Global Surgery "Hand-Off" Visits

Because surgeons are not supposed to bill separately for post-operative visits to patients in the global period, it is not possible using only administrative data to directly determine whether they are seeing patients less often after surgery or for how long per visit. One would need to review clinical medical records. We can only infer that surgeons are "handing-off" patients if post-operative claims of other physicians and clinicians like nurse practitioners are billing more frequently. Thus, post-operative visit rates within the global period for other than the performing surgeon become our indicator of the hand-off rate. Visits unrelated to the study surgery present a severe confounding problem. Many patients undergoing a major surgery have other chronic comorbid illnesses requiring treatment as well as developing new, acute, conditions that may or may not require hospitalization during the global period. Five, albeit imperfect, approaches to minimizing the effects of unrelated visits are used in our study.

First, because we are comparing post-operative visit rates between two years, most of the effects of unrelated visits "cancel out" if we assume only minor increases in the frequency of other confounding illnesses among the elderly in one sample. The primary drivers of greater comorbid conditions are an aging of the Medicare population and shifts in the gender-race distribution. We conducted an analysis of the age-gender-race distribution of patients in each surgery group and found no change between the two years. This may be surprising at first because the Medicare 5% sample includes the claim histories of beneficiaries for several years until death. Our focus on very specific, major, surgeries, however, produces a new set of patients in 2004 compared with 1995. The odds are slight that a patient would undergo bypass, colorectal, or any other of the study surgeries in 1995 and then again in 2004. Consequently, the age-gender-race distribution remains practically constant between the two periods as many new, younger, beneficiaries are added to the file. With no material change in patient demographics, at least for patients undergoing our surgeries, it is reasonable to expect little increase in illnesses that generate unrelated visits by physicians.

Second, because the frequency of unrelated physician visits is much less likely within a shorter post-operative window, we calculated visit rates on both the standard 90-day global period and a shorter 30-day period.

Third, the pool of physicians seeing patients after their major surgery can be separated into two groups. One group would be specialists who likely are treating other comorbid illnesses. For example, our heart bypass sample shows small numbers of visits by ophthalmologists and orthopedic and colorectal surgeons during the global period. They clearly are not following up (or managing) the patient's recovery specifically from the heart surgery. Then there is another

group of physicians and clinicians who quite likely are involved in the post-operative follow-up. We identified a set of six specialty groups most likely to be involved in follow-up care besides the performing surgeon:

- Family Practice
- Internal Medicine
- Hospital Intensivists
- General Surgery
- Nurse Practitioner
- Physician Assistant.

These six we considered "Hand-Off Specialties." Admittedly, some of their visits during the global period will be for unrelated illnesses, but the frequency of unrelated care for the six groups should be much less than for specialties such as ophthalmology for bypass patients. To this common list we added a few "likely hand-off" specialties relevant to the particular surgery:

Surgery Group	**Related Specialty**
Orthopedic	Orthopedic surgeon, physical medicine
Cardiovascular	Pulmonary, Cardiology
AAA	Thoracic, Vascular surgeon
Colorectal	Gastroenterology, Colorectal & Oncology surgeon
Prostate	Urology, Oncology surgeon
Hysterectomy	Gynecology, Obstetrics/gynecology
Neurosurgery	Neurology, neurosurgery, physical medicine.

While some study surgeries involve the same specialties as the performing surgeon, the visit rates are based only on physicians other than the performing surgeon. Thus, a AAA surgeon, for example, might hand-off the follow-up period to another vascular surgeon. Visit rates for these specialties are displayed along with the common six potential hand-off specialties.

Fourth, not all types of visits are equally likely to be hand-off visits. This is why we limited the set of visits to the 10 groups described earlier. However, even within the 10 groups, some types of visits are more likely to involve hand-offs than others. Three other possible indicators of growing numbers of hand-offs are the following:

1. New and Established office visits
2. Critical Care and Subsequent Hospital Visits
3. Nurse Practitioner, Physician Assistant, and Intensivist visits.

If visits in these groups are growing faster than average for all post-operative visits across the seven surgery groups, this would be evidence of greater surgeon hand-offs.

5.3.5 Analytic Methods

To understand the driving forces behind the growth in post-operative visits, we began with the following decomposition formula for Medicare total allowed charges per beneficiary undergoing a particular surgery:[16]

$$(5.1)\quad TCH/B = CF \times GPCI \times [(TRVU/B) = (TRVU/B)_{md} + (TRVU/B)_{pe} + (TRVU/B)_{mp}]$$

where

- CF = the MFS annual conversion factor, incorporating MEI updates
- GPCI = the Geographic Practice Cost Index
- TCH/B = Total allowable Medicare charges per beneficiary
- TRVU/B = Total RVUs for all post-operative visits per beneficiary
- $(TRVU/B)_{md,pe,mp}$ = Total RVUs per beneficiary for physician work, practice expense, and malpractice costs, respectively.

Total RVUs can be derived either by summing each HCPCS's work effort and practice and malpractice expenses taken from the Federal Register or by dividing total allowed visit charges by the conversion factor and adjusting for transition blending. Both approaches are used in the analysis. Any differences can be attributed to minor shifts in the geographic distribution of services reflected in charges but not in the published RVUs. The effect of shifts in surgery mix within a broad group will produce differences between charge-based and actual RVU counts. Transition blending will also cause minor differences in the two approaches.

Allowable visit charges can rise because of (a) updates in the conversion factor, (b) CMS increases in the official number of RVUs of service, or (c) the intensity of care. Total RVUs, at the individual HCPCS level, can be further decomposed into raw visit counts per beneficiary weighted by their RVU content, i.e.,

$$(5.2)\qquad TRVU/B = (V/B) \times (TRVU/V) = (V/B) \times (rvu/v)_{md} \times (1+\rho)$$

where

- $(rvu/v)_{md}$ = physician work RVUs for a given visit
- ρ = the ratio of the sum of practice and malpractice expense RVUs over physician work RVUs.

[16] Eq (5.1) does not account for the 50-50% blended transition in allowed charges in 1995. We provide rough adjustments for blending in the analysis below based on Appendix 5C.

Post-operative visit intensity, TRVU/B, can increase because patients are seeing physicians more often after surgery (V/B), or each visit involves more physician work effort, rvu/v_{md}, and/or the practice or malpractice costs are increasing relative to work effort (measured by ρ). The RVUs per visit are determined by CMS and the RUC and published annually in the Federal Register.

To explain changes in follow-up visits, the ratio of post-operative allowed charges per beneficiary in 2004 versus 1995, ignoring GPCI and blending effects for now, can be decomposed into a set of ratios that capture RVU price and intensity changes as well as frequency of physician contacts:

$$(5.3) \quad \left[\frac{(TCH/B)_{04}}{(TCH/B)_{95}}\right] = \left[\frac{CF_{04}}{CF_{95}}\right] X \left[\frac{(V/B)_{04}}{(V/B)_{95}}\right] X \left[\frac{(rvu/v)_{md,04}}{(rvu/v)_{md,95}}\right] X \left[\frac{(1+\rho_{04})}{(1+\rho_{95})}\right]$$

Eq. (5.3) answers the question of which of the RVU price (CF) and raw versus visit mix intensity factors are driving the increase in Medicare allowed charges for visits following surgery. The percent change, or difference, in total allowed visit charges between 1995 and 2004 can be expressed as a weighted percent change in each of the four components plus an interaction term (not shown). The weights are HCPCS shares of total RVUs applied to the growth in physician RVUs, practice and malpractice RVUs (captured by $(1+\rho)$), and in each HCPCS' change in visits. Positive visit growth per beneficiary raises total charges per beneficiary. RVUs per visit change with changes in the billed mix of visits over time. The interaction term accounts for positive or negative correlations between changes in physician, practice, and malpractice RVUs as well as in visits. The greater the interaction term, the more difficult it is to isolate the effects of any particular change, such as CMS-approved increases in physician work effort.

To decompose the trend, the conversion factors were taken from the Federal Register for 2004 and 1995 as were the RVUs per visit for physician work and practice and malpractice expenses. Three different conversion factors for 1995 were summed to a single factor using Medicare E&M payment shares as weights (see ***Appendix 5A***).

Two sets of 90-day or 30-day hand-off tables were constructed for each of the seven surgery groups, one set for the 10 visit groups, and another by specialty. Only the 90-day tables appear in this section. Thirty-day tables appear in ***Appendix 5B.*** In these tables, total RVUs per visit are calculated as a residual by dividing total charges by the conversion factor. Work, expense, and malpractice RVUs are not shown separately. The geographic mix of services is assumed unchanged over 1995-2004. Rough allowances are made in the text for the possible effects of blending of 1995 allowed charges and the fee schedule that overstate the growth in total RVUs. A common set of six "hand-off" specialties appear at the top of each table that are believed to be most directly related to follow-up surgery care. The next four specialties are shown either because they had high 2004 average total allowed visit charges per beneficiary or were also thought to be potential hand-off specialties. The remaining specialties are included in a single "Other" category. Two totals lines are shown in the tables, one for the six likely hand-off visit types or specialties and a "bottom line" total that includes all visits and specialties.

Two decomposition tables are also presented summarizing overall changes by surgery group. One table displays just total RVUs per visit efforts while a second table decomposes

RVUs per visit into its components, i.e., CMS increases in work and expenses-plus-malpractice RVUs per type of visit, the changing visit mix, and the growth in visits.

5.4 Comparison of Post-Operative Visit Allowed Charges, Visits, & RVUs per Beneficiary

T***ables 5-3a through 5-9b*** present results that compare allowed charges, visits, and RVUs between 1995 and 2004 only for visits occurring on the day of surgery through 90 days for each patient's first study surgery. Because TRVUs are calculated as a residual by dividing total allowed charges by the conversion factor, their growth between 1995 and 2004 is likely over-estimated by 3.4% in 1995 (see Appendix 5C) because of blending in 1995 that elevated allowed charges by a similar percentage. For example, in Table 5-3a, orthopedic total allowed charges per beneficiary (all specialties) rose 44% between 1995 and 2004. Three and one-half percentage points might have been due to the elimination of blending after 1995. This suggests that TRVUs per visit grew 26%, not 28% ((1.44-.034)/(1.027)(1.09)). Adjustments of minus 2-3 percentage points apply to all the rest of the tables.

Table 5-10 summarizes the changes in 2004 over the 1995 rates for the seven groups. Over the 9-year period, allowed charges per beneficiary (patient) undergoing surgery in one of the seven groups increased 53% on average using a 90-day window (Table 5–10). Without the effects of transition blending, the growth was slightly less than 50 percent. Increases ranged from a low of 28% for an abdominal aortic aneurysm (AAA) to 68% for hysterectomy surgery.

Over the same period, the number of (paid) post-operative visits per beneficiary increased 16%, ranging from a low of 6% for AAA surgery to a high of 21% for heart surgery. If true hand-offs by surgeons to other physicians who then follow patients' recovery from surgery are best captured by increasing rates of post-operative visits per beneficiary, then at most, hand-offs could explain about one-third of the increase in Medicare allowed charges. This would also assume that the proportion of physician visits unrelated to the study surgery (or the shift in surgery within broad group) did not change over the time period. If unrelated visits are increasing, which is likely given the secular growth in Medicare visits, then the rate of true hand-offs is somewhat less than 16% and make a smaller contribution to charge increases.

There was a concomitant increase in total RVUs per visit (visit intensity) of 27% (25% without blending), ranging from a low of 18% for AAA surgery to a high of 40% for hysterectomy surgery. Total RVUs per beneficiary (total intensity) increased 48% (46% without blending). The conversion factor increased 2.7% (not shown on tables), implying that practically all of the increase in Medicare allowed charges for these surgeries was due to increased RVUs per beneficiary, or the intensity of services

If visits to particular specialties of a particular type are growing faster across the seven surgery groups, this would be stronger evidence of greater surgeon hand-offs. Altogether, there are 56 visit-specialty categories for comparison purposes (i.e., New or Established visits, Critical Care or Subsequent Hospital visits; six "hand-off" specialties, considered as a whole, and Nurse Practitioners, Physician Assistants, and Intensivists, by the seven surgery groups).[17] Limiting the

[17] Although we did not include hospital consults among our hand-off visit group initial hospital consults also showed strong growth by surgery group between 1995 and 2004 (Section 3.3, Table 3-3 above).

analysis to just 30 days post-operative further reduces the likelihood of confounding unrelated visits. Visit growth per beneficiary was faster in 42 of the possible 56 cells (see ***Table 5-11***) as indicated by bolded figures. Both NPs and PAs exhibited extraordinary growth, albeit from very small levels. Intensivist visit rates in the hospital increased from 30% to over 100%. ICU critical care visits per patient increased faster than average in six of seven cells.

Table 5-12 provides a more detailed decomposition of the growth in total allowed post-operative visit charges per beneficiary (unique patient) that separates out (to the extent possible) the effects of increased physician, practice, and malpractice RVUs per visit. Column 1 reports the overall percent change in visit allowed charges per beneficiary (53%; 49.5% adjusting for blending). Column 2 gives the (uniform) percent change in the MFS conversion factor (2.7%). Column 3 shows the growth in visits per beneficiary (16%). Columns 4–7 decompose the growth in total RVUs per visit into 4 components: (1) CMS' approved increases in physician work RVUs, (2) changes in visit billing mix, (3) changes in practice and malpractice RVUs per physician work RVU (i.e., $1+\rho$), and (4) changes in visits in the denominator of RVUs/visit. The last column in the table accounts for the interaction effects among the other explanatory variables.

Conversion Factor. Between 1995 and 2004, the MFS conversion factor increased only 2.7% from $36.37 to $37.334. This modest increase is due to constraints implied in the BBA legislation tying total physician spending to the growth in the economy.

Visits per Beneficiary. Visits per beneficiary grew 6% to 21%, depending upon type of surgery, and averaged 16%.

RVUs per (HCPCS) Visit. CMS-approved increases in work RVUs per (HCPCS) procedure contributed a consistent 18-19 percentage points to the growth in total allowed charges. Although the CMS increases in work RVUs per visit are practically identical across surgeries (holding visit mix constant), the effect on allowed charge increases per beneficiary varies in importance by surgery group. It is most prominent for AAA, abdominal aortic aneurysm surgery, explaining about two-thirds of the (relatively modest) charge increase per beneficiary (18%/28%). The effect of work RVU increases was a bit less than one-half the increase in allowed charges per beneficiary for orthopedic and neurosurgery and about one-third for heart, colorectal, and prostate surgery. Work RVU increases per visit explained the least of the allowed charge increase for hysterectomy surgery (about one-quarter).

Table 5-3a
ORTHOPEDIC Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	11701	18057		11701	18057							
"Hand-off" Specialties[e]												
Family practice	28.87	51.63	*1.79*	0.71	0.90	*1.27*	1.11	1.53	*1.38*	0.79	1.38	*1.74*
Internal medicine	95.71	156.64	*1.64*	2.11	2.52	*1.19*	1.24	1.66	*1.34*	2.63	4.20	*1.59*
Critical care (intensivists)	0.79	1.60	*2.03*	0.01	0.02	*1.53*	1.65	2.13	*1.29*	0.02	0.04	*1.98*
General surgery	4.67	4.48	*0.96*	0.09	0.06	*0.70*	1.47	1.96	*1.33*	0.13	0.12	*0.93*
Nurse practitioner	0.01	3.76	*461.83*	0.00	0.08	*234.09*	0.65	1.26	*1.92*	0.00	0.10	*449.87*
Physician assistant	0.08	3.77	*46.57*	0.00	0.08	*30.74*	0.87	1.28	*1.48*	0.00	0.10	*45.37*
Total[c]	**130.12**	**221.87**	***1.71****	**2.93**	**3.66**	***1.25***	**1.22**	**1.62**	***1.33***	**3.58**	**5.94**	***1.66****
Other Specialties[d]												
Physical medicine	83.34	119.44	*1.43*	1.72	2.00	*1.16*	1.33	1.60	*1.20*	2.29	3.20	*1.40*
Cardiology	22.82	30.11	*1.32*	0.42	0.45	*1.06*	1.48	1.79	*1.21*	0.63	0.81	*1.29*
Pulmonary disease	10.77	18.23	*1.69*	0.20	0.24	*1.24*	1.50	2.00	*1.33*	0.30	0.49	*1.65*
Orthopedic surgery	3.98	5.45	*1.37*	0.08	0.08	*1.01*	1.37	1.82	*1.33*	0.11	0.15	*1.34*
Other	90.11	95.66	*1.06*	1.83	1.42	*0.78*	1.36	1.80	*1.32*	2.48	2.56	*1.03*
Total (all specialties)[c]	**341.13**	**490.76**	***1.44****	**7.18**	**7.86**	***1.09***	**1.31**	**1.67**	***1.28***	**9.38**	**13.14**	***1.40****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Specialties = Specialties either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Specialties = Specialties typically delegated post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-3b
ORTHOPEDIC Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	11701	18057		11701	18057		11701	18057				
"Hand-off" Visits[e]												
New office visit	4.36	7.33	*1.68*	0.07	0.08	*1.08*	1.72	2.61	*1.52*	0.12	0.20	*1.64*
Establish office visit	41.88	90.57	*2.16*	1.18	1.61	*1.37*	0.98	1.50	*1.54*	1.15	2.43	*2.11*
Critical ICU care	4.75	9.39	*1.98*	0.03	0.05	*1.48*	3.99	5.20	*1.30*	0.13	0.25	*1.92*
Subsequent hospital visit	197.24	253.89	*1.29*	4.80	4.97	*1.03*	1.13	1.37	*1.21*	5.42	6.80	*1.25*
Total[c]	**248.23**	**361.18**	***1.46***	**6.08**	**6.71**	***1.10***	**7.82**	**10.68**	***1.37***	**6.82**	**9.68**	***1.42***
Other Visits[d]												
Confirm consult	0.25	0.12	*0.50*	0.00	0.00	*0.43*	2.03	2.28	*1.13*	0.01	0.00	*0.49*
Office consult	5.50	12.29	*2.24*	0.06	0.09	*1.53*	2.68	3.81	*1.42*	0.15	0.33	*2.18*
Initial hospital consult	46.19	66.61	*1.44*	0.44	0.55	*1.23*	2.87	3.27	*1.14*	1.27	1.78	*1.40*
Initial hospital observe	0.51	0.73	*1.42*	0.01	0.01	*1.14*	2.28	2.77	*1.21*	0.01	0.02	*1.38*
Initial hospital visit	26.60	41.98	*1.58*	0.25	0.33	*1.32*	2.92	3.39	*1.16*	0.73	1.12	*1.54*
Follow-up hospital consult	13.87	8.47	*0.61*	0.34	0.19	*0.57*	1.11	1.16	*1.05*	0.38	0.23	*0.59*
Total (all visits)[c]	**341.16**	**491.39**	***1.44****	**7.18**	**7.87**	***1.10***	**1.31**	**1.67**	***1.28***	**9.38**	**13.16**	***1.40****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Visits = Visits either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Visits = Visits typically involving post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-4a
CABGVALVE Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	8881	7937		8881	7937							
"Hand-off" Specialties[e]												
Family practice	31.48	66.01	*2.10*	0.75	1.08	*1.44*	1.16	1.64	*1.42*	0.87	1.77	*2.04*
Internal medicine	162.18	294.60	*1.82*	3.19	4.27	*1.34*	1.40	1.85	*1.32*	4.46	7.89	*1.77*
Critical care (intensivists)	13.44	31.94	*2.38*	0.14	0.32	*2.30*	2.66	2.68	*1.01*	0.37	0.86	*2.31*
General surgery	11.07	15.30	*1.38*	0.18	0.21	*1.16*	1.69	1.96	*1.16*	0.30	0.41	*1.35*
Nurse practitioner	0.06	8.92	*137.69*	0.00	0.17	*68.61*	0.72	1.41	*1.95*	0.00	0.24	*134.12*
Physician assistant	0.04	6.38	*181.90*	0.00	0.13	*128.93*	0.95	1.31	*1.37*	0.00	0.17	*177.18*
Total[c]	**218.27**	**423.16**	***1.94****	**4.26**	**6.17**	***1.45****	**1.41**	**1.84**	***1.30***	**6.00**	**11.33**	***1.89****
Other Specialties[d]												
Cardiology	348.41	393.59	*1.13*	7.01	6.14	*0.88*	1.37	1.72	*1.26*	9.58	10.54	*1.10*
Pulmonary disease	106.28	208.78	*1.96*	1.66	2.60	*1.56*	1.76	2.15	*1.23*	2.92	5.59	*1.91*
Infectious disease	35.10	70.45	*2.01*	0.64	1.03	*1.61*	1.51	1.84	*1.22*	0.96	1.89	*1.96*
Physical medicine	28.89	58.45	*2.02*	0.57	0.96	*1.67*	1.38	1.63	*1.18*	0.79	1.57	*1.97*
Other	207.16	327.09	*1.58*	3.65	4.63	*1.27*	1.56	1.89	*1.21*	5.70	8.76	*1.54*
Total (all specialties)[c]	**944.11**	**1,481.53**	***1.57****	**17.80**	**21.52**	***1.21****	**1.46**	**1.84**	***1.26***	**25.96**	**39.68**	***1.53****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Specialties = Specialties either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Specialties = Specialties typically delegated post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-4b
CABGVALVE Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	8881	7937		8881	7937		8881	7937				
"Hand-off" Visits[e]												
New office visit	6.42	11.00	*1.71*	0.09	0.10	*1.07*	1.91	2.98	*1.55*	0.18	0.29	*1.67*
Establish office visit	99.96	176.96	*1.77*	2.64	2.96	*1.12*	1.04	1.60	*1.54*	2.75	4.74	*1.72*
Critical ICU care	87.47	155.86	*1.78*	0.57	0.79	*1.37*	4.19	5.31	*1.27*	2.40	4.17	*1.74*
Subsequent hospital visit	582.63	873.31	*1.50*	12.67	15.50	*1.22*	1.26	1.51	*1.19*	16.02	23.39	*1.46*
Total[c]	**776.48**	**1217.13**	***1.57***	**15.97**	**19.35**	***1.21***	**8.4**	**11.4**	***1.36***	**21.35**	**32.59**	***1.53***
Other Visits[d]												
Confirm consult	0.46	0.30	*0.65*	0.00	0.00	*0.81*	2.57	2.00	*0.78*	0.01	0.01	*0.63*
Office consult	9.16	18.62	*2.03*	0.10	0.13	*1.33*	2.63	3.92	*1.49*	0.25	0.50	*1.98*
Initial hospital consult	101.27	175.19	*1.73*	0.86	1.28	*1.48*	3.23	3.67	*1.14*	2.78	4.69	*1.69*
Initial hospital observe	1.66	2.41	*1.45*	0.02	0.02	*1.16*	2.22	2.69	*1.21*	0.05	0.06	*1.41*
Initial hospital visit	29.61	49.68	*1.68*	0.27	0.37	*1.38*	3.06	3.63	*1.19*	0.81	1.33	*1.63*
Follow-up hospital consult	25.51	18.53	*0.73*	0.58	0.39	*0.68*	1.21	1.27	*1.05*	0.70	0.50	*0.71*
Total (all visits)[c]	**944.15**	**1,481.86**	***1.57****	**17.80**	**21.53**	***1.21****	**1.46**	**1.84**	***1.26***	**25.96**	**39.69**	***1.53****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Visits = Visits either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Visits = Visits typically involving post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-5a
AAA Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	638	333		638	333							
"Hand-off" Specialties[e]												
Family practice	35.03	54.67	*1.56*	0.82	0.91	*1.11*	1.17	1.61	*1.37*	0.96	1.46	*1.52*
Internal medicine	181.74	226.71	*1.25*	3.25	3.57	*1.10*	1.54	1.70	*1.10*	5.00	6.07	*1.22*
Critical care (intensivists)	15.60	24.73	*1.58*	0.15	0.23	*1.61*	2.94	2.83	*0.96*	0.43	0.66	*1.54*
General surgery	12.57	17.84	*1.42*	0.23	0.19	*0.82*	1.53	2.57	*1.68*	0.35	0.48	*1.38*
Nurse practitioner	0.04	7.13	*165.72*	0.00	0.15	*93.88*	0.76	1.30	*1.72*	0.00	0.19	*161.43*
Physician assistant	0.11	7.25	*63.93*	0.00	0.16	*101.54*	1.99	1.22	*0.61*	0.00	0.19	*62.27*
Total[c]	**245.09**	**338.34**	***1.38***	**4.44**	**5.21**	***1.17***	**1.52**	**1.74**	***1.15***	**6.74**	**9.06**	***1.34***
Other Specialties[d]												
Pulmonary disease	117.84	200.96	*1.71*	1.74	2.47	*1.41*	1.86	2.18	*1.18*	3.24	5.38	*1.66*
Cardiology	140.65	163.03	*1.16*	2.73	2.55	*0.93*	1.42	1.71	*1.21*	3.87	4.37	*1.13*
Thoracic surgery	1.68	0.19	*0.11*	0.03	0.01	*0.23*	1.73	0.85	*0.49*	0.05	0.01	*0.11*
Peripheral vascular disease	2.52	N/A	*N/A*	0.05	N/A	*N/A*	1.52	N/A	*N/A*	0.07	N/A	*N/A*
Other	220.54	229.19	*1.04*	3.93	3.47	*0.88*	1.54	1.77	*1.15*	6.06	6.14	*1.01*
Total (all specialties)[c]	**728.32**	**931.71**	***1.28****	**12.92**	**13.70**	***1.06***	**1.55**	**1.82**	***1.18***	**20.03**	**24.95**	***1.25****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Specialties = Specialties either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Specialties = Specialties typically delegated post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-5b
AAA Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	638	333		638	333		638	333				
"Hand-off" Visits[e]												
New office visit	5.05	5.14	*1.02*	0.07	0.05	*0.78*	2.01	2.55	*1.27*	0.14	0.14	*0.99*
Establish office visit	61.06	121.48	*1.99*	1.63	2.11	*1.30*	1.03	1.55	*1.50*	1.68	3.25	*1.94*
Critical ICU care	114.45	119.74	*1.05*	0.79	0.64	*0.81*	4.00	5.04	*1.26*	3.15	3.21	*1.02*
Subsequent hospital visit	405.14	523.61	*1.29*	8.77	9.40	*1.07*	1.27	1.49	*1.17*	11.14	14.02	*1.26*
Total[c]	**585.7**	**769.97**	***1.31***	**11.26**	**12.2**	***1.08***	**8.31**	**10.63**	***1.28***	**16.11**	**20.62**	***1.28***
Other Visits[d]												
Confirm consult	0.04	N/A	*N/A*	0.00	N/A	*N/A*	0.75	N/A	*N/A*	0.00	N/A	*N/A*
Office consult	8.58	13.57	*1.58*	0.09	0.10	*1.13*	2.69	3.67	*1.36*	0.24	0.36	*1.54*
Initial hospital consult	84.84	109.90	*1.30*	0.72	0.85	*1.18*	3.25	3.48	*1.07*	2.33	2.94	*1.26*
Initial hospital observe	1.59	0.74	*0.47*	0.02	0.01	*0.44*	2.14	2.20	*1.03*	0.04	0.02	*0.45*
Initial hospital visit	18.74	20.26	*1.08*	0.17	0.16	*0.97*	3.07	3.35	*1.09*	0.52	0.54	*1.05*
Follow-up hospital consult	28.83	17.27	*0.60*	0.67	0.38	*0.57*	1.18	1.21	*1.03*	0.79	0.46	*0.58*
Total (all visits)[c]	**728.32**	**931.71**	***1.28****	**12.92**	**13.70**	***1.06***	**1.55**	**1.82**	***1.13***	**20.03**	**24.95**	***1.25****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Visits = Visits either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Visits = Visits typically involving post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-6a
COLORECTAL Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	12325	13898		12325	13898							
"Hand-off" Specialties[e]												
Family practice	45.04	72.53	*1.61*	1.08	1.23	*1.14*	1.15	1.58	*1.38*	1.24	1.94	*1.57*
Internal medicine	147.22	236.59	*1.61*	3.05	3.58	*1.17*	1.33	1.77	*1.34*	4.05	6.34	*1.57*
Critical care (intensivists)	5.39	13.91	*2.58*	0.07	0.13	*1.95*	2.23	2.88	*1.29*	0.15	0.37	*2.51*
General surgery	9.51	16.16	*1.70*	0.14	0.20	*1.39*	1.85	2.21	*1.19*	0.26	0.43	*1.66*
Nurse practitioner	0.01	3.70	*251.87*	0.00	0.07	*111.18*	0.62	1.37	*2.21*	0.00	0.10	*245.35*
Physician assistant	0.07	3.08	*42.30*	0.00	0.06	*28.18*	0.91	1.34	*1.46*	0.00	0.08	*41.21*
Total[c]	**207.25**	**345.97**	***1.67****	**4.34**	**5.27**	***1.21***	**1.31**	**1.76**	***1.34***	**5.70**	**9.27**	***1.63****
Other Specialties[d]												
Pulmonary disease	45.41	84.65	*1.86*	0.71	1.06	*1.50*	1.77	2.14	*1.21*	1.25	2.27	*1.82*
Gastroenterology	36.37	45.34	*1.25*	0.76	0.74	*0.97*	1.32	1.65	*1.25*	1.00	1.21	*1.21*
Colorectal surgery	0.14	0.52	*3.74*	0.00	0.01	*3.24*	1.62	1.82	*1.12*	0.00	0.01	*3.64*
Surgical oncology	0.07	0.28	*4.01*	0.00	0.00	*3.92*	1.99	1.98	*1.00*	0.00	0.01	*3.91*
Other	199.58	301.53	*1.51*	3.82	4.37	*1.14*	1.44	1.85	*1.29*	5.49	8.08	*1.47*
Total (all specialties)[c]	**488.82**	**778.28**	***1.59****	**9.62**	**11.44**	***1.19****	**1.40**	**1.82**	***1.30***	**13.44**	**20.84**	***1.55****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Specialties = Specialties either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Specialties = Specialties typically delegated post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-6b
COLORECTAL Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	12325	13898		12325	13898		12325	13898				
"Hand-off" Visits[e]												
New office visit	5.47	9.21	*1.68*	0.08	0.09	*1.11*	1.85	2.74	*1.48*	0.15	0.25	*1.64*
Establish office visit	60.38	114.67	*1.90*	1.72	1.97	*1.15*	0.97	1.56	*1.61*	1.66	3.07	*1.85*
Critical ICU care	39.86	72.69	*1.82*	0.28	0.37	*1.32*	3.92	5.26	*1.34*	1.10	1.95	*1.78*
Subsequent hospital visit	283.90	437.07	*1.54*	6.42	7.79	*1.21*	1.22	1.50	*1.24*	7.81	11.71	*1.50*
Total[c]	**389.61**	**633.64**	***1.63***	**8.5**	**10.22**	***1.20***	**7.96**	**11.06**	***1.39***	**10.72**	**16.98**	***1.58***
Other Visits[d]												
Confirm consult	0.22	0.31	*1.40*	0.00	0.00	*0.96*	2.06	2.94	*1.42*	0.01	0.01	*1.37*
Office consult	11.70	23.93	*2.04*	0.10	0.15	*1.48*	3.13	4.22	*1.35*	0.32	0.64	*1.99*
Initial hospital consult	51.78	81.04	*1.57*	0.44	0.60	*1.36*	3.21	3.59	*1.12*	1.42	2.17	*1.52*
Initial hospital observe	1.12	1.75	*1.56*	0.01	0.02	*1.27*	2.16	2.59	*1.20*	0.03	0.05	*1.52*
Initial hospital visit	16.35	27.07	*1.66*	0.15	0.20	*1.34*	2.96	3.57	*1.21*	0.45	0.72	*1.61*
Follow-up hospital consult	18.06	10.55	*0.58*	0.41	0.24	*0.57*	1.20	1.20	*1.00*	0.50	0.28	*0.57*
Total (all visits)[c]	**488.86**	**778.31**	***1.59****	**9.62**	**11.44**	***1.19****	**1.40**	**1.82**	***1.30***	**13.44**	**20.85**	***1.55****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Visits = Visits either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Visits = Visits typically involving post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-7a
PROSTATE Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	835	518		835	518							
"Hand-off" Specialties[e]												
Family practice	17.25	21.87	*1.27*	0.43	0.34	*0.80*	1.11	1.71	*1.55*	0.47	0.59	*1.24*
Internal medicine	48.28	77.66	*1.61*	1.06	1.16	*1.09*	1.25	1.80	*1.44*	1.33	2.08	*1.57*
Critical care (intensivists)	1.33	0.74	*0.55*	0.02	0.00	*0.25*	2.36	5.13	*2.17*	0.04	0.02	*0.54*
General surgery	4.57	6.23	*1.36*	0.10	0.10	*1.02*	1.24	1.60	*1.29*	0.13	0.17	*1.33*
Nurse practitioner	0.03	0.83	*24.60*	0.00	0.03	*20.96*	0.77	0.88	*1.14*	0.00	0.02	*23.97*
Physician assistant	N/A	2.33	*N/A*	N/A	0.04	*N/A*	N/A	1.41	*N/A*	N/A	0.06	*N/A*
Total[c]	**71.48**	**109.65**	***1.53***	**1.61**	**1.68**	***1.04***	**1.22**	**1.75**	***1.44***	**1.97**	**2.94**	***1.49***
Other Specialties[d]												
Pulmonary disease	9.98	26.08	*2.61*	0.16	0.28	*1.74*	1.70	2.48	*1.46*	0.27	0.70	*2.54*
Cardiology	21.29	23.14	*1.09*	0.38	0.32	*0.86*	1.55	1.91	*1.23*	0.59	0.62	*1.06*
Gastroenterology	4.88	9.26	*1.90*	0.08	0.14	*1.63*	1.60	1.81	*1.13*	0.13	0.25	*1.85*
Urology	3.50	6.43	*1.84*	0.09	0.11	*1.34*	1.13	1.51	*1.34*	0.10	0.17	*1.79*
Other	39.76	62.60	*1.57*	0.74	0.85	*1.14*	1.47	1.97	*1.34*	1.09	1.68	*1.53*
Total (all specialties)[c]	**150.89**	**237.16**	***1.57****	**3.06**	**3.38**	***1.10***	**1.35**	**1.88**	***1.39***	**4.15**	**6.35**	***1.53****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Specialties = Specialties either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Specialties = Specialties typically delegated post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-7b
PROSTATE Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	835	518		835	518		835	518				
"Hand-off" Visits[e]												
New office visit	3.19	5.45	*1.71*	0.05	0.06	*1.04*	1.63	2.61	*1.60*	0.09	0.15	*1.66*
Establish office visit	31.72	59.30	*1.87*	0.92	1.02	*1.11*	0.95	1.56	*1.64*	0.87	1.59	*1.82*
Critical ICU care	4.14	17.13	*4.14*	0.03	0.08	*3.22*	4.32	5.40	*1.25*	0.11	0.46	*4.03*
Subsequent hospital visit	66.77	96.57	*1.45*	1.57	1.75	*1.12*	1.17	1.47	*1.26*	1.84	2.59	*1.41*
Total[c]	**105.82**	**178.45**	***1.69***	**2.57**	**2.91**	***1.13***	**8.07**	**11.04**	***1.37***	**2.91**	**4.79**	***1.65***
Other Visits[d]												
Confirm consult	0.33	0.17	*0.51*	0.00	0.00	*0.54*	2.56	2.35	*0.92*	0.01	0.00	*0.49*
Office consult	7.48	18.45	*2.47*	0.07	0.12	*1.72*	2.96	4.13	*1.40*	0.21	0.49	*2.40*
Initial hospital consult	24.77	29.88	*1.21*	0.22	0.23	*1.04*	3.09	3.48	*1.13*	0.68	0.80	*1.18*
Initial hospital observe	0.25	N/A	*N/A*	0.00	N/A	*N/A*	1.92	N/A	*N/A*	0.01	N/A	*N/A*
Initial hospital visit	5.25	8.41	*1.60*	0.05	0.06	*1.32*	3.09	3.65	*1.18*	0.14	0.23	*1.56*
Follow-up hospital consult	6.99	3.15	*0.45*	0.15	0.06	*0.43*	1.31	1.33	*1.02*	0.19	0.08	*0.44*
Total (all visits)[c]	**150.89**	**238.52**	***1.58****	**3.06**	**3.39**	***1.11***	**1.35**	**1.88**	***1.39***	**4.15**	**6.56**	***1.54****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Visits = Visits either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Visits = Visits typically involving post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-8a
HYSTERECTOMY Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	209	249		209	249							
"Hand-off" Specialties[e]												
Family practice	26.91	36.97	*1.37*	0.59	0.58	*0.98*	1.26	1.71	*1.36*	0.74	0.99	*1.34*
Internal medicine	66.83	126.85	*1.90*	1.35	1.89	*1.40*	1.36	1.80	*1.32*	1.84	3.40	*1.85*
Critical care (intensivists)	2.04	13.72	*6.73*	0.04	0.09	*2.41*	1.46	3.98	*2.72*	0.06	0.37	*6.56*
General surgery	3.33	11.11	*3.34*	0.08	0.17	*2.20*	1.20	1.76	*1.48*	0.09	0.30	*3.25*
Nurse practitioner	N/A	5.01	*N/A*	N/A	0.10	*N/A*	N/A	1.34	*N/A*	N/A	0.13	*N/A*
Physician assistant	N/A	0.73	*N/A*	N/A	0.02	*N/A*	N/A	1.22	*N/A*	N/A	0.02	*N/A*
Total[c]	**99.11**	**194.39**	***1.96****	**2.05**	**2.85**	***1.39***	**1.33**	**1.83**	***1.38***	**2.73**	**5.21**	***1.91****
Other Specialties[d]												
Cardiology	30.88	40.52	*1.31*	0.51	0.59	*1.16*	1.66	1.83	*1.10*	0.85	1.09	*1.28*
Pulmonary disease	17.18	30.68	*1.79*	0.30	0.41	*1.37*	1.59	2.03	*1.27*	0.47	0.82	*1.74*
Infectious disease	3.57	22.31	*6.25*	0.07	0.30	*4.14*	1.37	2.01	*1.47*	0.10	0.60	*6.08*
Obstetrics/Gynecology	6.54	9.28	*1.42*	0.20	0.18	*0.92*	0.92	1.37	*1.50*	0.18	0.25	*1.38*
Other	125.37	176.53	*1.41*	2.18	2.03	*0.93*	1.58	2.33	*1.47*	3.45	4.73	*1.37*
Total (all specialties)[c]	**282.64**	**473.71**	***1.68****	**5.31**	**6.36**	***1.20***	**1.46**	**2.05**	***1.40***	**7.77**	**13.02**	***1.68****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Specialties = Specialties either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Specialties = Specialties typically delegated post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-8b
HYSTERECTOMY Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	209	249		209	249							
"Hand-off" Visits[e]												
New office visit	8.48	8.44	*1.00*	0.11	0.08	*0.73*	2.12	2.82	*1.33*	0.23	0.23	*0.97*
Establish office visit	57.42	90.31	*1.57*	1.66	1.61	*0.97*	0.95	1.50	*1.57*	1.58	2.42	*1.53*
Critical ICU care	7.83	29.74	*3.80*	0.06	0.16	*2.73*	3.75	5.09	*1.36*	0.22	0.80	*3.70*
Subsequent hospital visit	112.46	177.41	*1.58*	2.49	3.28	*1.32*	1.24	1.45	*1.17*	3.09	4.75	*1.54*
Total[c]	**186.19**	**305.9**	***1.64***	**4.32**	**5.13**	***1.19***	**8.06**	**10.86**	***1.35***	**2.91**	**4.79**	***1.65***
Other Visits[d]												
Office consult	47.32	75.41	*1.59*	0.43	0.50	*1.17*	3.02	4.02	*1.33*	1.30	2.02	*1.55*
Initial hospital consult	37.61	74.87	*1.99*	0.33	0.55	*1.63*	3.09	3.67	*1.19*	1.03	2.01	*1.94*
Initial hospital observe	N/A	0.55	*N/A*	N/A	0.01	*N/A*	N/A	1.83	*N/A*	N/A	0.01	*N/A*
Initial hospital visit	4.97	17.26	*3.47*	0.04	0.13	*2.98*	3.17	3.60	*1.13*	0.14	0.46	*3.38*
Follow-up hospital consult	9.77	3.90	*0.40*	0.22	0.09	*0.41*	1.19	1.13	*0.95*	0.27	0.10	*0.39*
Total (all visits)[c]	**285.87**	**477.88**	***1.67****	**5.34**	**6.41**	***1.20***	**1.47**	**2.00**	***1.36***	**7.86**	**12.80**	***1.63****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Visits = Visits either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Visits = Visits typically involving post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-9a
NEUROSURGERY Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	502	671		502	671							
"Hand-off" Specialties[e]												
Family practice	52.91	75.30	*1.42*	1.27	1.01	*0.79*	1.14	2.00	*1.76*	1.45	2.02	*1.39*
Internal medicine	315.00	411.68	*1.31*	6.29	5.94	*0.95*	1.38	1.85	*1.35*	8.66	11.03	*1.27*
Critical care (intensivists)	22.22	52.56	*2.37*	0.26	0.48	*1.86*	2.38	2.95	*1.24*	0.61	1.41	*2.30*
General surgery	36.40	42.76	*1.17*	0.55	0.54	*0.98*	1.81	2.11	*1.16*	1.00	1.15	*1.14*
Nurse practitioner	N/A	13.08	*N/A*	N/A	0.24	*N/A*	N/A	1.44	*N/A*	N/A	0.35	*N/A*
Physician assistant	N/A	9.01	*N/A*	N/A	0.15	*N/A*	N/A	1.64	*N/A*	N/A	0.24	*N/A*
Total[c]	**426.53**	**604.40***	***1.42***	**8.37**	**8.36**	***1.00***	**1.40**	**1.94**	***1.38***	**11.73**	**16.19**	***1.38****
Other Specialties[d]												
Pulmonary disease	92.63	205.65	*2.22*	1.44	2.55	*1.78*	1.77	2.16	*1.22*	2.55	5.51	*2.16*
Physical medicine	134.85	195.88	*1.45*	2.86	3.48	*1.22*	1.29	1.51	*1.16*	3.71	5.25	*1.41*
Neurology	110.39	171.91	*1.56*	2.12	2.34	*1.10*	1.43	1.97	*1.37*	3.04	4.60	*1.52*
Neurosurgery	12.59	8.18	*0.65*	0.18	0.10	*0.54*	1.95	2.30	*1.18*	0.35	0.22	*0.63*
Other	370.66	520.80	*1.41*	6.35	7.00	*1.10*	1.61	1.99	*1.24*	10.19	13.95	*1.37*
Total (all specialties)[c]	**1,147.64**	**1,706.80**	***1.49****	**21.31**	**23.83**	***1.12***	**1.48**	**1.92**	***1.30***	**31.55**	**45.71**	***1.45****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Specialties = Specialties either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Specialties = Specialties typically delegated post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-9b
NEUROSURGERY Post-Operative Visit Allowed Charges, RVUs, and Visits by Specialty: 90-day Window

	Allowed Charge/Bene			Number of Visits/Bene[a]			TRVUs per Visit[b]			TRVUs/Bene[b]		
	1995	2004	2004/1995	1995	2004	2004/1995	1995	2004	2004/1995[f]	1995	2004	2004/1995[f]
Unique beneficiaries	502	671		502	671		502	671				
"Hand-off" Visits[e]												
New office visit	6.46	11.98	*1.86*	0.09	0.10	*1.12*	1.94	3.12	*1.61*	0.18	0.32	*1.81*
Establish office visit	56.51	124.11	*2.20*	1.53	1.94	*1.27*	1.02	1.71	*1.68*	1.55	3.32	*2.14*
Critical ICU care	118.29	211.85	*1.79*	0.79	1.06	*1.34*	4.10	5.35	*1.31*	3.25	5.67	*1.74*
Subsequent hospital visit	682.58	960.88	*1.41*	15.86	17.32	*1.09*	1.18	1.49	*1.26*	18.77	25.74	*1.37*
Total[c]	**863.84**	**1308.82**	***1.52***	**18.27**	**20.42**	***1.12***	**8.24**	**11.67**	***1.42***	**23.75**	**35.05**	***1.48***
Other Visits[d]												
Confirm consult	0.73	0.44	*0.60*	0.01	0.00	*0.37*	1.67	2.62	*1.56*	0.02	0.01	*0.59*
Office consult	27.38	55.33	*2.02*	0.26	0.36	*1.39*	2.91	4.13	*1.42*	0.75	1.48	*1.97*
Initial hospital consult	165.80	237.04	*1.43*	1.46	1.87	*1.28*	3.12	3.39	*1.09*	4.56	6.35	*1.39*
Initial hospital observe	2.64	2.13	*0.80*	0.03	0.02	*0.75*	2.43	2.55	*1.05*	0.07	0.06	*0.78*
Initial hospital visit	46.23	79.51	*1.72*	0.43	0.60	*1.41*	2.97	3.54	*1.19*	1.27	2.13	*1.68*
Follow-up hospital consult	41.03	25.71	*0.63*	0.85	0.57	*0.67*	1.32	1.20	*0.91*	1.13	0.69	*0.61*
Total (all visits)[c]	**1,147.64**	**1,708.98**	***1.49****	**21.31**	**23.86**	***1.12***	**1.48**	**1.92**	***1.30***	**31.55**	**45.77**	***1.45****

NOTES:

* = p<.05

[a]Numerator includes only claims with positive allowed visit charges for other than performing surgeon. Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[b]TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

[c]Totals unweighted by number of patients in each group.

[d]Other Visits = Visits either with highest 2004 allowed charges or related to primary surgery.

[e]"Hand-off" Visits = Visits typically involving post-operative follow-up care.

[f]TRVU growth overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files; Part b 95_04_N (5/21/07); Part b 95_64_Table 1.all/all30.

Table 5-10
Percent Change in Post-Operative Visit Allowed Charges, Number of Visits, and RVUs for Beneficiary,
30- and 90-Day Windows: 2006 v. 1995

	Allowed Charges/Bene		Visits/Bene[a]		TRVUs/Visit[b,d]		TRVU/Bene[b,d]	
Surgical Group	90	30	90	30	90	30	90	30
Orthopedic	44%	35%	9%	5%	28%	28%	40%	31%
Cabgvalve	57	48	21	17	26	24	53	44
AAA	28	29	6	5	18	22	25	25
Colorectal	59	52	19	17	30	30	55	48
Prostate	57	21	10	-12	39	37	53	17
Hysterectomy	68	52	20	14	40	30	68	48
Neurosurgery	49	48	12	14	30	27	45	44
Average[c]	**53%**	**44%**	**16%**	**12%**	**27%**	**26%**	**48%**	**38%**

NOTES:

* = p<.05

[a] Numerator includes only claims with positive allowed visit charges for other than performing surgeon.

[b] TRVUs = Allowed charges/conversion factor = total RVUs including work, practice and malpractice.

Bene = Number of unique patients undergoing particular surgery with or without positive visit charges.

[c] Totals weighted by number of patients or visits in each group.

[d] Percent changes in TRVUs overstated by 2-3 percentage points due to switch from 50-50% transition blending in 1995 to the full fee schedule in 1996.

SOURCE: Taken from Tables 5-3a through 5-9b plus Appendix 5B tables.

Table 5-11
30-day Growth Rates in "Hand-Off" Related Visits and Specialties Per Beneficiary: 1995 and 2004

	Orthopedic	CABG Valve	AAA[a]	Colorectal	Prostate	Hysterectomy	Neurosurgery	Proportion with Above-Average Growth Rates
	30-day increases (all visits)							
	1.05	1.17	1.05	1.17	0.88	1.14	1.14	
	30-day increases (selected visits, specialties)							
"Hand-off" Visits								
New Office	1.05	1.12	0.87	1.12	**1.15**	0.63	**1.27**	2 of 7
Established Office	**1.53**	1.00	**1.31**	**1.21**	**1.14**	0.96	**1.18**	5 of 7
ICU Critical Care	**1.28**	**1.29**	1.01	**1.28**	**2.79**	**2.82**	**1.30**	6 of 7
Subsequent Hospital	1.03	**1.18**	**1.08**	**1.19**	0.82	**1.15**	1.14	4 of 7
"Hand-off" Specialties								
All Six	**1.19**	**1.38**	**1.12**	1.16	.76	**1.29**	0.98	5 of 7
Nurse Practitioner	**666.00**	**83.00**	**63.00**	**152.00**	**13.00**	+	+	7 of 7
Physician Assistant	**30.00**	**158.00**	+	**29.00**	+	+	+	7 of 7
Intensivist	**1.32**	**2.16**	**1.37**	**2.03**	**0**.12	**2.64**	**1.68**	7 of 7

NOTES:

[a] Abdominal Aortic Aneurysm procedure.

Bolded 30-day rates greater than average 30-day increase in all visits/beneficiary.

+ = positive increase from zero

SOURCE: 1995 and 2004 Medicare 5% physician/supplier claims files.

Table 5-12
Decomposition of Percent Change in Post-Operative Visit Allowed Charges
Per Beneficiary Using Work Effort, Practice, And Malpractice RVUs, 90-Day Window, 1995-2004

Surgical Group	Allowed Charges per Beneficiary	Conversion Factor	Visits per Beneficiary	TRVU per visit				
				RVU per HCPCS[a]	Visit Mix[a]	Practice and Malpractice[a]	Visits[b]	Interaction[c]
Orthopedic	44%	2.7%	9%	19.9%	84.5%	-13.8%	-69.0%	10.7%
CABG Valve	57	2.7	21	19.0	17.0	-11.6	-8.0	16.9
AAA	28	2.7	6	18.0	-42.6	-10.9	44.7	10.1
Colorectal	59	2.7	19	18.9	48.4	-12.2	-33.9	16.1
Prostate	57	2.7	10	19.0	-20.6	-13.4	31.3	23.4
Hysterectomy	68	2.7	20	18.3	61.5	-12.8	-42.6	25.4
Neurosurgery	49	2.7	12	18.8	71.4	-12.1	-49.6	5.8
Average	**53**	**2.7**	**16**	**19.0**	**40.0**	**-12.1**	**-29.4**	**16.8**

NOTES:

[a] Percentages based on HCPCS weighted share of total RVUs for 41 HCPCS visit codes.

[b] Negative percentages indicate increases in total visits and declines in TRVU/visit within surgery group.

[c] Difference between first column and sum of columns 2–7. Represents compound multiplicative effect of explanatory variables.

SOURCE: Conversion factors: MD, PE, MP RVUs from 1995 and 2004 Federal Registers; allowed charges, visits: 1995 and 2004 Medicare 5% Part B physician/supplier claims files.

Visit Mix. Positive changes in visit mix capture the effect of physicians shifting to higher RVU visits over time. This shift averaged 40% overall and was quite dramatic for orthopedic surgery (84.5%), neurosurgery (61.5%), and hysterectomy surgery (71.4%).[18] It was also fairly substantial for colorectal surgery. To give one example, intermediate established office visits (99213) to orthopedic patients increased 77% and 186% for more complex office visits (99214). The frequency of shorter visits of just ten minutes (99212) increased only 33%. The two longer office visit codes in 2006 were believed by CMS to involve 50% and 150% more work than a "problem focused" visit (99212). Subsequent orthopedic hospital visits (99232, 99233) with higher work RVUs increased 96% and 116%, respectively, while the lowest valued follow-up inpatient visit (99231) increased only 9%. AAA and prostate surgery were unusual in exhibiting declines in the RVU intensity of their post-operative visits.

Practice Expenses. CMS and the RUC have made substantial reductions in the practice expense RVUs for all of the studied post-operative visits. The common office and inpatient follow-up visit RVUs for practice expenses fell about one-third between 1995 and 2004 (CMS RVU History files; also Appendix Table 6a for 99000 visit series). Malpractice costs, which are about one-eighth the size of practice expense RVUs, rose slightly for most visits (except for critical care malpractice RVUs that doubled). Consequently, the growth in the $(1+\rho)$ adjustment factor produced a fairly consistent decline in visit allowed charges of about 12%. If the visit mix had not changed between 1995–2004, the average increase in physician work RVUs (19%) would have offset the declines in practice and malpractice expense RVUs by about 7 percentage points, resulting in a modest increase in allowed charges per beneficiary.

Visits. RVUs per HCPCS, visit mix, and practice and malpractice expenses all affect the numerator of TRVUs per visit. The increase in visits in the denominator resulted in partially offsetting declines in RVUs per visit and allowed charges per beneficiary. The visit effect is greatest for orthopedic surgery given the remarkable increase in visits (69% by simple unweighted count). As shown in ***Table 5-12***, the RVU-weighted mix of visits grew faster than the unweighted, raw count and contributed to a net increase of 11.6 (40%–29.4%) percentage points in TRVU/V and allowed charges per beneficiary. In most of the surgery groups, the strong shift to higher RVU codes more than offset the growth in visits, thereby raising RVUs per visit. The overall net effect of changes in the number and mix of visits on TRVUs per visit was about 10 percentage points (40%–29%).

Summary of Decomposition. From Table 5-10, the growth in total RVUs per visit explained roughly one-half of the growth in post-operative visit allowed charges per beneficiary. The positive shift in visit mix to higher work RVU codes explained the majority of the higher RVUs per visit with CMS-approved increases in RVUs for visit codes contributing about one-half as much.

[18] Visit mix effects in Table 5-12 will also include effects of differential surgical volume growth within broad surgery category.

SECTION 6
TRENDS IN RUC & CMS RECOMMENDED SERVICE TIMES, RVUS, WORK PER UNIT TIME (WPUT), & DISTORTED MULTIPLE POINTS OF COMPARISON

6.1 Introduction

6.1.1 Annual RVU Updates, Renormalization, & MPC Distortion

Soon after the Harvard research team completed the design and construction of the resource-based Medicare Fee Schedule (MFS), CMS delegated (and continues to delegate) most of the updating tasks to a newly formed AMA Relative Value Update Committee (RUC). This committee formed of specialty representatives are responsible for conducting surveys of physicians regarding changes in physician work for new and existing CPT service codes. The RUC, in turn, delegate the responsibility of surveying their members to the various specialty societies. Committee members then evaluate the results of the surveys regarding work effort and make recommendations back to CMS staff who have final decision authority.

Besides the potential conflict of interest inherent in this delegation to specialty societies, the review process is subject to a prior bias in which services are recommended for review. Either specialty societies or physicians are the primary sources of codes to be reviewed. Specialties first request that the AMA's CPT Board add a new code to the list of thousands of existing codes. These additions sometimes are for truly new procedures involving new technologies, while many are for finer-grained distinctions in an existing family of codes. Once a new code is added to the CPT list, the RUC delegates the fact-finding task to the relevant specialty society and its members. This provides an opportunity to "overstate" the relative value of the new code, especially if it is rapidly growing in volume.

CMS staff have been aware of the potential upward bias in RUC-recommended work effort. To minimize the distortion in Medicare payments to a particular specialty, CMS adopted a renormalization process within an affected family of codes (for details see below). This process permitted rapid increases in payments in re-valued services at the expense of lower RVUs for "related" procedures in the family of codes and put each family "on its own tub."

The effects of renormalization raise particular problems with the Multiple Points of Comparison codes. These codes form the "anchors" or "links" across families of codes. In calibrating relative work effort, the Harvard team developed vignettes for services associated with the major specialties and conducted surveys of their members. It was infeasible to ask most specialists to evaluate the relative work of services outside their sphere of training and experience (e.g., asking a cardiologist to compare the work involved in an angioplasty to laser eye or finger reattachment surgery). Once relative value scales were determined within specialty and families of codes, Harvard organized cross-specialty panels to evaluated "common" or "anchor" codes that put all CPT codes on a single RVU scale.

Renormalization within families has also changed the RVUs of several of the MPCs as well. If an MPC's RVUs have been altered within family without consideration of the cross-family or cross-specialty impacts, then the link across broad groups of codes is distorted. If these distorting effects continue unchecked over time, the cross-specialty integrity of the resource-

based scale loses its meaning. Every specialty and its associated service codes become increasingly isolated from other specialties and their codes. MPCs provide a "realism" check on changes between made within smaller groups of codes.

Because of the inherently subjective nature of evaluating the work involved in performing a surgery, interpreting an x-ray, and seeing a patient in the office, it is difficult to judge whether annual and 5-year updates in physician RVUs have become distorted. One check that has been used in the past relies on measures of WPUT, or work per unit time of the physician providing the service. Time is thought to be an important component of overall work effort. Certainly, a service that takes three times as long as another should involve more total work, although there can be differences in work intensity that mitigate time differences. Rapid changes in WPUT over a few years raise serious questions about the validity of the allowed changes in work RVUs.

6.1.2 Purposes of the Section

The analysis in this section has two primary goals:

- To determine how much physician work and payments have changed over time for the set of study surgeries thought to be experiencing substantial changes in practice patterns and productivity gains.

- To show the extent to which the Multiple Point of Comparison links have changed over time and whether the changes have been systematically related to specialty.

6.1.3 Summary of Key Findings

Between 1992 and 2006, the 30 study surgery codes experienced a 32% average increase in their work RVUs, including pre- and post-operative visits. Three surgical codes had over 50% increases in work effort. Only total hip replacement experienced a decline in physician work effort, and only because CMS disagreed with the RUC by comparing hip replacement's work effort to a vagotomy and reducing work RVUs during the third 5-year review. Relative to the decline in surgeon work effort for total hip replacement, mitral valve replacement's work effort nearly doubled (82% increase), followed by colon removal at nearly 70%. Hip replacement work effort is now valued at roughly 18 intermediate office visits (99213) while mitral valve replacement is equivalent to 50 intermediate office visits. It is not clear why such a large gap in work effort has developed, presumably given greater patient severity over time in both procedures.

To translate some of the increases in work effort into dollars, consider that both an intermediate office visit (99213) had its work RVUs increased from 0.59 to 0.92 over 15 years. Valued using the 2006 conversion factor of $37.34, the increase generated an additional $13.82 per visit by the physician. Over the same period, a total colon removal (99150) had its work RVUs increased by 10.4, resulting in an increase of $388 for each procedure. A 5-venous heart bypass (33514) experienced only a 31% increase in work RVUs, resulting in a $361 increase in Medicare payment for each procedure.

In the recent 5-year review, CMS disagreed with most all of the RUC recommended increases in work effort for heart surgery. Nevertheless, the agency made only small reductions in the RUC's recommendations and still approved major increases in work effort within codes.

While perceived work effort has been increasing as evidenced by allowed increases in physician work RVUs, total times for surgery and associated visits have been declining according to the RUC's surveys of surgeons. Total times fell 8.4%, on average, across the 30 study procedures between 1999 and 2006, the two years of available data on times. On an hourly basis, physician work effort (WPUT) increased by 23% over this short 7-year period. Only 5-of-30 procedures showed declining work effort per hour. Heart surgery is particularly noteworthy, as bypass and valve surgery saw increases in the surgeon's hourly work effort ranging between 67% and 85%. To cite one example, a single artery coronary bypass (33533) had its work RVUs increased by 45% between 1999 and 2006 while at the same time surgeons were reporting a 22% decline in total global package times. Because CMS staff and its internal workgroup did evaluate work effort per unit time for a few other procedures, it is not clear from the Federal Register notice for 2006 why such large increases in WPUT were allowed for heart surgery. The inconsistent use of WPUT statistics to evaluate changes in work effort across disparate procedures may be creating distortions and inequities even among surgical procedures not to mention among medical procedures and visits.

To out knowledge, no systematic effort has been made to re-evaluate the work effort involved in the Multiple Points of Comparison (MPCs) across specialties. It is critical to the integrity of the fee schedule that the MPCs maintain their cross-specialty validity in terms of work effort. If some MPCs are being increased more than others and then are being used as references to yet other codes in their family, the relative meaning of the fee schedule is jeopardized.

The 361 MPCs with work values in 1992 and 2006 experience a (RVU-weighted) increase in work RVUs of 20% over the first 15 years of the MFS. This increase is greater than on an unweighted basis, implying that MPCs assigned greater work effort in 1992 received higher than average increases, led by the Respiratory MPCs at 37%. Cardiovascular and Digestive MPCs received 35% increases in their MPCs. The 31 E&M visit codes as a group experienced a 30% increase in work RVUs as well, although several of these include the higher RVU hospital follow-up visits after surgery. Specialties with little increase in their MPC work RVUs include radiology, pathology, and medicine (mainly special tests). MPCs with the greatest increase in work RVUs span a wide range. Code 34201, leg arterial embolectomy, experienced a 123% increase in work RVUs to 18.4 (slightly higher than a total hip replacement) while a cervical biopsy (58100) experienced the second highest 110% increase to 1.53 RVUs. A common diagnostic protosigmoidoscopy (45303) had one of the greatest decreases in work RVUs (nearly 50% less). It is also among a family of codes in which the RUC recommended major increases in the latest 5-year review but CMS rejected entirely because the RUC used a work-per-unit time argument for the increase.

Closer inspection of the top 15 MPCs in terms of work effort found major shifts in their relative ranking over 15 years. An excision of a brain tumor (61518), ranked number five in terms of work effort in 1992, fell to number 15 in 2006 and is now considered equivalent to

breast reconstruction with flap (19364). Conversely, a bone flap craniotomy saw its work RVUs increase, resulting in a shift from the 8th to the 3td most work intensive MPC.

Wide swings in the ranking of MPCs raise questions about their value in holding the resource-based schedule together in a coherent, meaningful, way. It is not possible for us to independently recalibrate the MPCs. The purpose of this section is simply to document the extent to which work effort has changed in unequal ways over the life of the MFS and demonstrate the need for a systematic examination of the links that assure cross-specialty accuracy and fairness in relative work effort. Public commenters in each 5-year review are requested by CMS to use any of the reference codes in grounding their recommended changes in work effort. In addition, physicians asked to rate work on a family of procedures use the MPCs of their choice in gauging relative work effort of new or split procedures. Moreover, over 40 new MPCs have been added to the list over time and many dropped from the list. This, again, raises questions about the use of new MPCs in linking work effort across specialties.

Given that global surgeon times with patients have been falling while work effort has been allegedly increasing, the implication is that productivity has been rising—by 23% on average for our major surgeries. This would be true if greater work effort also translated into greater improvements in health status if patients are sicker and are being returned to good health. Alternatively, greater work per unit time could simply mean that physician input is increasing per hour which would imply lower productivity when measured by patients treated per work RVU. Still, it is difficult to reconcile declining physician productivity with substantial reductions in the total time that surgeons spend with patients before, during, and after their surgery. Moreover, many physician practices use Medicare RVUs as a measure of physician output rather than as an input. They do so because Medicare keys payment on RVUs and not on the number of quality-adjusted patients treated. If RVUs are output, then the government does not appear to be sharing in the productivity gains of physicians who are seeing and treating more patients and billing for more services per hour.

6.1.4 Organization of Section

The rest of this section is organized into two broad sets of analyses. Section 6.2 analyzes trends in global surgical times, RVUs, and work per unit time. Section 6.3 shows changes in the MPCs and to what degree distortions have been systematic across broad specialty groups.

6.2 Analysis of Trends in Global Surgery Times, RVUs, & WPUT

6.2.1 Data Sources

Two data sources were made available to us by CMS staff to track changes in estimated times and RVUs associated with physician work. **TIMEDATA.XLS** is a CMS file that contains estimates of total physician time associated with the work relative values and was the source of time data to develop the resource-based practice expense RVUs. The Harvard time estimates have been placed on the RUC scale. Estimated total service time prior to the addition of visit time associated with the global period is provided. In addition, total service time, including visit time, is included as is an estimate of the number and level of post-operative visits during the global period.

RVU HISTORY FILE is a database that was developed and maintained by CMS as an effort to track changes to the RBRVS work RVUs over time. In addition to work RVU information, this database also updates information on practice expense and malpractice expense RVUs. Among other uses, this file can be used to identify codes that have experienced substantial increases in work RVUs. The file is updated annually with the release of the fees for the upcoming year. It is also updated quarterly to reflect any changes that are made throughout the year.

Some of the analyses also rely on the work, practice expense, and malpractice RVUs that appeared in the 1992, 1995, 1999, and 2004 Federal Registers. These registers provide the RVUs to be used by the carriers in paying for physician services in the coming year.

6.2.2 Use of WPUT by Harvard for Identifying Mis-valued Services

A potential bias inherent in the estimates of physician times and RVUs for certain services is that they are based exclusively on *subjective* responses to physician surveys conducted, first, by the Harvard research team and then on an on-going basis by specialty societies under AMA RUC direction. Physician respondents are asked how much time is involved in the pre-, intra-, and post-procedure phases and how much total "work" a procedure or service involves relative to other services. Work, distinct from times, involves subjective estimates of the "intensity" and "stress" involved in providing a service. Respondents have strong financial incentives to overstate the work involved because higher RVUs translate into higher Medicare payments.

One check on the accuracy of subjective responses, first used by Harvard researchers (Braun *et al.*, 1988a), is to calculate work RVUs per unit time. Procedures reportedly involving greater work over time without any (or little) increase in pre/intra/post time may be mis-valued. When reviewing the results for service work, physician consultants to the Harvard study hypothesized that two services involving a similar technical approach, the same types of patients and requiring approximately equal amounts of time should also be similar in physician work – in other words these services should be similar in intensity. Further, the work of two clinically similar services requiring different amounts of time would likely vary proportionately with time – the work values would differ but work intensity would be similar. These hypotheses led the Harvard researchers to compute the ratio of physicians' judgments about work and time and use the result to assist in assessing the face validity of the study results on work. This ratio was called work per unit of time (WPUT).

The estimates of WPUT from the Harvard study suggested the following:

- The work per unit of time of the intra-portion of the service (IWPUT) varied systematically across broad clinical families of services. For example, the average IWPUT for an evaluation and management (E/M) service was found to be less than half that for an invasive service.

- Systematic variations also existed within broad clinical families. For E/M services, the average IWPUT for an office visit was 85% of that for a subsequent hospital visit and only three-fourths that for a critical care visit. Within invasive services, the

average IWPUT for a major surgery performed in an inpatient setting was one-third greater than that for an office-based procedure.

- The IWPUT values were relatively consistent within narrow clinical families,. For example, after controlling for the type of E/M service (e.g., office visit, consultation, hospital visit, critical care visit, etc.), service time explained 91% of the variation in intra-service work (Braun *et al.*, 1992). Similar values of IWPUT were also observed within a surgical specialty for clinically similar services.
- Pre- and post-surgical work is comprised of pre- and post-operative office and hospital visits and other activities that are E/M in nature. As a result, pre- and post-service work per unit of time (PPWPUT) for invasive services is similar to the IWPUT for an E/M service and lower than the IWPUT of the surgery itself. PPWPUT values for non-surgical services (E/M services, diagnostic services, other medical services, etc.) were somewhat less than that observed for the intra-portion of the same service.

6.2.3 Trends in Global Surgery RVUs, Times, and WPUT

RVU Trends. ***Table 6-1*** displays the physician work RVUs for 30 different study surgeries grouped into seven surgical groups. These belong to the same set of "hand-off" surgeries analyzed in Section 5. RVUs span the full 15 years that the MFS has been in existence. Percent changes are also displayed for three periods: 1992-1999 that includes the updates from the first 5-year review; 1999-2006 that includes updates from the two subsequent 5-year reviews; and 1992-2006 covering the full 15-year period. The last three columns show the work effort of all the other surgeries relative to 27130, total hip replacement. First, at the beginning of MFS and then in 2006 after three 5-year reviews and any interim adjustments. The percent increases in the last column, therefore, show maximum rates of divergence across the 32 surgeries.

In 1992, the 30 codes averaged 23.97 work RVUs. By 2006, the same codes averaged 31.63 RVUs, representing a 32% increase in work effort, on average. Only total hip replacement experienced a decline in work effort over the entire period (-9.1%). It is also one of very few codes where CMS disagreed with the RUC recommendation and reduced work RVUs below the 2005 value (see Section 1.2.3 for details). By 2006, code 33430 (mitral valve replacement) involved the greatest work of any studied code (49.81 physician RVUs). It also displayed the greatest percent increase in work effort (65.3%). The five codes with the greatest percent increase were

- 33430 (mitral valve replacement): 65.3%
- 44120 (small intestine removal): 53.6%
- 44150 (removal of colon): 53.4%
- 35081 (repair of artery defect): 46.7%
- 33425 (mitral valve repair): 46.5%.

Table 6-1
Levels and Percent Changes in Work RVUs, Seven Surgical Groups, 1992, 1999, 2006

	MD RVUs			Percent Change			RVU Relative to 27130		
CPT Codes	1992	1999	2006	1992-1999	1999-2006	1992-2006	1992	2006	% Change
ORTHOPEDIC	**15.7**	**16.5**	**15.6**	**4.4**	**-2.4**	**1.8**	**0.8**	**0.9**	**11.9**
27130	19.1	20.1	17.4	5.0	-14.0	-9.0	1.0	1.0	0.0
27447	20.2	21.5	20.8	6.0	-3.0	3.0	1.1	1.2	13.0
29881	7.6	7.8	8.5	2.0	10.0	11.0	0.4	0.5	22.0
CABGVALVE	**28.8**	**30.8**	**39.3**	**6.8**	**28.4**	**36.8**	**1.5**	**2.3**	**50.5**
33405	29.2	30.6	40.0	5.0	31.0	37.0	1.5	2.3	51.0
33425	26.2	27.0	38.4	3.0	42.0	47.0	1.4	2.2	61.0
33430	30.1	31.4	49.8	4.0	58.0	65.0	1.6	2.9	82.0
33510	23.4	25.1	33.5	7.0	33.0	43.0	1.2	1.9	57.0
33511	25.3	27.4	34.6	9.0	26.0	37.0	1.3	2.0	51.0
33512	27.1	29.7	38.7	9.0	31.0	43.0	1.4	2.2	57.0
33513	29.0	32.0	39.7	10.0	24.0	37.0	1.5	2.3	51.0
33514	30.8	35.0	40.5	14.0	16.0	31.0	1.6	2.3	45.0
33516	32.7	37.4	42.0	14.0	12.0	28.0	1.7	2.4	41.0
33533	25.6	25.8	37.4	1.0	45.0	46.0	1.3	2.1	61.0
33534	28.0	28.8	38.8	3.0	35.0	39.0	1.5	2.2	52.0
33535	30.4	31.8	41.5	5.0	30.0	36.0	1.6	2.4	50.0
33536	32.9	34.8	40.8	6.0	17.0	24.0	1.7	2.3	37.0
33542	27.2	28.9	32.7	6.0	13.0	20.0	1.4	1.9	32.0
33545	34.8	36.8	41.1	6.0	12.0	18.0	1.8	2.4	30.0
AAA									
35081	**22.7**	**28.0**	**33.3**	**23.0**	**19.0**	**47.0**	**1.2**	**1.9**	**61.0**
COLORECTAL	**15.2**	**16.2**	**21.8**	**6.9**	**34.6**	**43.9**	**0.8**	**1.3**	**58.3**
44120	13.5	14.5	20.7	8.0	43.0	54.0	0.7	1.2	69.0
44140	17.5	18.4	22.4	5.0	22.0	28.0	0.9	1.3	41.0
44150	19.5	21.0	29.9	8.0	42.0	53.0	1.0	1.7	69.0
44160	14.4	15.9	20.7	10.0	30.0	43.0	0.8	1.2	58.0
47600	10.9	11.4	15.4	4.0	35.0	41.0	0.6	0.9	55.0
PROSTATE									
55845	**27.4**	**28.6**	**30.5**	**4.0**	**7.0**	**11.0**	**1.4**	**1.8**	**22.0**
HYSTERECTOMY	**22.7**	**25.2**	**26.8**	**10.5**	**6.4**	**17.6**	**1.1**	**1.5**	**29.4**
58200	20.8	21.6	23.0	4.0	6.0	10.0	1.1	1.3	21.0
58210	24.6	28.9	30.7	17.0	6.0	25.0	1.3	1.8	38.0
NEUROSURGERY	**22.8**	**25.8**	**28.8**	**13.1**	**11.9**	**26.8**	**1.1**	**1.7**	**39.5**
61312	21.0	24.6	30.0	17.0	22.0	43.0	1.1	1.7	57.0
61314	23.3	24.2	25.7	4.0	6.0	10.0	1.2	1.5	21.0
61510	24.0	28.5	30.6	19.0	7.0	28.0	1.3	1.8	40.0
Average	**24.0**	**25.9**	**31.6**	**8.0**	**22.0**	**32.0**	**1.3**	**1.8**	**45.0**

NOTES: Averages unweighted.

SOURCES:

1992 data from the November 25, 1992 Federal Register, Medicare Program; Fee Schedule for Physicians' Services for Calendar Year 1993, Final Rule.

1999 data from November 2, 1999 Federal Register, Medicare Program; Revisions to Payment Policies Under the Physician Fee Schedule for Calendar Year 2000; Final Rule.

2006 data from June 29, 2006 Federal Register, Medicare Program; Five-Year Review of Work Relative Value Units Under the Physician Fee Schedule and Proposed Changes to the Practice Expense Methodology; Notice.

The majority of surgical procedures involved more work than a total hip replacement. Several of the heart surgery procedures in 1992 required 50-80% more work than a hip replacement. Because hip replacement was the only procedure that experienced a decline in work effort, all other procedures increased in relative work effort. In 1992, work effort for hip replacement was equivalent to removal of colon (44150). After the third 5-year review, colon removal was rated as involving 70% more work. By 2006, code 33430, which was rated as 60% more work than a hip replacement in 1992, was now rated as involving 190% (2.9-fold) more work. Other codes experiencing over 60% increases in their work relative to a total hip replacement included:

- 33430: 81.8% increase
- 44120: 61.4%
- 44150: 68.7%
- 35081: 61.4%
- 33425: 61.2%
- 33533 (CABG, single artery): 60.8%.

Many of the large increases in work RVUs for the heart surgery and colorectal surgery codes came in the latest 5-year review (see ***Appendix Table 1A***). CMS disagreed with the RUC's recommendation on practically all of the heart surgery codes (as well as 44120) but still approved substantial increases in their work effort by effectively reducing the RUC recommendation by about 10%, on average (see Section 1.2 and Appendix Table 1A). While the divergence in cross-specialty work effort was most pronounced between total hip replacement and the other procedures, a few other differences are worth noting that occurred primarily in the third 5-year review. In general, heart, colon, and brain surgery became more work intensive than knee, eye, and hysterectomy surgery.

Times and WPUT Trends. ***Table 6-2*** reports 1999-2006 changes in physician work effort in relation to changes in reported final (total) times for the surgical procedures. (We did not have access to the original 1992 times.) The table also shows changes in work per unit hour (WPUT) and the 2006 WPUT for total hip replacement in relation to the other surgeries. Over this 7-year period, physician work RVUs increased 22%, ranging from -13.5% to +58.5%. Over the same period, estimated total times (including associated pre- and post-operative visits) fell 8.4%, ranging from -30% to +69.2%, resulting in a net increase of 23% in WPUT. Only 5-of-30 surgeries showed declining work effort per hour of physician time. Heart bypass surgery using arterial grafts exhibited increases in WPUT of 67-85% over the period. Many other heart surgeries showed WPUT increases over 50%, as did a couple colorectal surgeries. To cite an extreme example, code 33533 (CABG, 1 artery) had its physician work effort increased by 45% while reported total time fell by 22%. The net result was an 85% increase in physician work per hour.

Table 6-2
Trends in Work Effort, Service Times, & WPUT, 1999 and 2006

	MD RVUs			Total Time (minutes)			WPUT/hour			WPUT Relative to (27130)[a]
CPT Codes	1999	2006	% Change	1999	2006	% Change	1999	2006	% Change	2006
ORTHOPEDIC	**16.5**	**15.6**	**-2.4**	**439.7**	**383.0**	**-9.8**	**2.2**	**2.5**	**16.2**	**1.12**
27130	20.1	17.4	-13.5	492.0	478.0	-2.8	2.5	2.2	-11.0	1.0
27447	21.5	20.8	-3.1	563.0	469.0	-16.7	2.3	2.7	16.3	1.2
29881	7.8	8.5	9.5	264.0	202.0	-23.5	1.8	2.5	43.2	1.2
CABGVALVE	**30.8**	**39.3**	**28.3**	**947.0**	**811.3**	**-11.3**	**2.0**	**2.9**	**50.5**	**1.3**
33405	30.6	40.0	30.6	938.0	769.0	-18.0	2.0	3.1	59.3	1.4
33425	27.0	38.4	42.1	520.0	880.0	69.2	3.1	2.6	-16.0	1.2
33430	31.4	49.8	58.5	938.0	904.0	-3.6	2.0	3.3	64.4	1.5
33510	25.1	33.5	33.2	896.0	718.0	-19.9	1.7	2.8	66.2	1.3
33511	27.4	34.6	26.2	936.0	750.0	-19.9	1.8	2.8	57.5	1.3
33512	29.7	38.7	30.5	972.0	832.0	-14.4	1.8	2.8	52.5	1.3
33513	32.0	39.7	24.2	1033.0	850.0	-17.7	1.9	2.8	51.0	1.3
33514	35.0	40.5	15.7	1078.0	867.0	-19.6	1.9	2.8	43.9	1.3
33516	37.4	42.0	12.2	1127.0	883.0	-21.7	2.0	2.9	43.2	1.3
33533	25.8	37.4	44.7	865.0	675.0	-22.0	1.8	3.3	85.5	1.5
33534	28.8	38.8	34.7	949.0	717.0	-24.4	1.8	3.2	78.2	1.5
33535	31.8	41.5	30.4	1033.0	755.0	-26.9	1.8	3.3	78.4	1.5
33536	34.8	40.8	17.2	1119.0	783.0	-30.0	1.9	3.1	67.6	1.4
33542	28.9	32.7	13.2	824.0	848.0	2.9	2.1	2.3	10.0	1.1
33545	36.8	41.1	11.8	974.0	939.0	-3.6	2.3	2.6	16.0	1.2
AAA										
35081	**28.0**	**33.3**	**18.9**	**609.0**	**677.0**	**11.2**	**2.8**	**3.0**	**7.0**	**1.4**
COLORECTAL	**16.2**	**21.8**	**34.6**	**537.0**	**540.0**	**7.4**	**1.9**	**2.4**	**27.5**	**1.1**
44120	14.5	20.7	42.8	473.0	611.0	29.2	1.8	2.0	10.5	0.9
44140	18.4	22.4	22.1	511.0	480.0	-6.1	2.2	2.8	30.0	1.3
44150	21.0	29.9	42.4	738.0	638.0	-13.6	1.7	2.8	64.7	1.3
44160	15.9	20.7	30.5	678.0	551.0	-18.7	1.4	2.3	60.6	1.0
47600	11.4	15.4	35.2	287.0	420.0	46.3	2.4	2.2	-7.6	1.0
PROSTATE										
55845	**28.6**	**30.5**	**6.7**	**645.0**	**659.0**	**2.2**	**2.7**	**2.8**	**4.4**	**1.3**
HYSTERECTOMY	**25.2**	**26.8**	**6.4**	**496.0**	**543.0**	**9.7**	**3.1**	**3.0**	**-3.0**	**2.7**
58200	21.6	23.0	6.3	416.0	459.0	10.3	3.1	3.0	-3.6	1.4
58210	28.9	30.7	6.4	575.0	627.0	9.0	3.0	2.9	-2.4	1.3
NEUROSURGERY	**25.8**	**28.8**	**11.9**	**568.0**	**621.5**	**9.3**	**2.7**	**2.8**	**2.3**	**1.3**
61312	24.6	30.0	22.2	598.0	689.0	15.2	2.5	2.6	6.1	1.2
61314	24.2	25.7	6.1	511.0	540.5	5.8	2.8	2.9	.3.0	1.3
61510	28.5	30.6	7.4	594.0	635.0	6.9	2.9	2.9	.4.0	1.3
Average	**25.9**	**31.6**	**22.0**	**739.0**	**677.0**	**-8.4**	**2.2**	**2.7**	**22.9**	**1.3**

NOTES:

Averages unweighted.

[a] Ratio of a given procedure's WPUT per hour in 2006 divided by code 27130 (=2.2).

SOURCES:

1992 data from the November 25, 1992 Federal Register, Medicare Program; Fee Schedule for Physcians' Services for Calendar Year 1993, Final Rule

1999 data from November 2, 1999 Federal Register, Medicare Program; Revisions to Payment Policies Under the Physician Fee Schedule for Calendar Year 2000; Final Rule

2006 data from June 29, 2006 Federal Register, Medicare Program; Five-Year Review of Work Relative Value Units Under the Physician Fee Schedule and Proposed Changes to the Practice Expense Methodology; Notice

Work effort per hour fell 11% for total hip replacement (27130) as work RVUs were reduced by CMS by a greater percentage (–13.5%) relative to the decline in total procedure time (–2.8%). As of 2006, total hip replacement had one of the lowest WPUTs of the 30 procedures; only 44120 (small intestine removal) had a lower WPUT. Work effort per hour was 50% greater for arterial bypasses and 70% greater for laser eye surgery (66984).

6.3 Analysis of Distortions of Multiple Points of Comparison (MPCs)

6.3.1 Technical Background

Original Cross-Specialty Links. The original resource-based relative value scale developed by Harvard was based on panels of specialists rating the work involved in providing services in their particular area of competence. Many such panels were involved. The final step in the process requiring linking the disparate ratings of services on a common scale. The Harvard-AMA team convened several panels of different specialists, first, to identify cross-specialty links and then to adjust for specialty-specific valuations of some of the reference procedures in terms of work (Braun *et al.*, 1988a). Panelists identified services across specialties that were equal (same service, different specialist) or equivalent (different service, same work). These procedures formed links between the rating systems of the separate specialist panels that had previously rated codes within narrow families. The separate specialty ratings of intra-service work for each of these 275 link procedures were used in a regression to determine inter-specialty work multipliers. Multipliers were needed because the specialty panels used different references procedures in scaling their codes. All specialty ratings were then placed on a common single scale by adjusting specialty-specific ratings of work by the link multipliers.

RAND researchers, under CMS contract, developed a modified linking process that was somewhat simpler (Morton, Kominski, and Kahan, 1994). They worked directly with CPT codes rather that vignettes. They also required that the links be transitive. If A involves more work than B which involves more work that C, then A must also involve more work than C. Linked codes must have the same work RVUs.

RAND and Harvard linking methods differed fundamentally in what could vary on the common scale. RAND forced all linked procedures to have the same work values which changed the within-specialty relative ratings. Harvard forced the within-specialty relative ratings to remain unchanged and shifted the work values of equivalent, linked, codes.

Updates in MPC Links. Over 15 years, or at least since the first 5-year review, the ability of the MPCs to properly link RVUs across specialties likely has declined. First, the RUC has taken upon itself to change work RVUs for selected MPCs within a particular specialty's family of codes. It is not clear how much consideration has been given to how reasonable the changes have been with regard to MPCs in other specialties. Second, CMS, in its annual review of revised and new codes with help from the RUC, has adjusted any changes within a family of codes to assure budget neutrality. Neutrality requires that the sum total of expected payments for the family of codes will not change with any changes in RVUs within the family. Previous year's volumes for each code are used to weight the differences in RVUs. All RVUs in the family of codes are reduced by the ratio of payments in the previous to the future year that includes new and revised codes. Changes in MPC RVUs are swept up in this renormalization process.

An indication of problems with the MPC links would be disproportionate changes in the MPCs across broad specialty groups. Some specialties may have had rapidly rising RVUs for several of their MPC codes because they have benefited from the biases in the annual 5-year review processes. If a specialty can increase its reference code RVUs, then it is a better position to argue for even greater RVUs for new and revised codes in comparison to other specialties with less favorable treatment of its own MPCs.

6.3.2 Data Sources & Methods

The list of MPCs was provided by CMS to the RUC and outside commenters prior to the first and second 5-year reviews. Work and Total RVUs for the MPCs have been taken from the 1992, 1999, and June 29, 2006 Federal Registers.

The 1992 RVUs represent the first work RVUs under the new MFS. The 1999 figures, which we collected under a previous contract (McCall *et al.*, 1999) represent RVUs in effect a couple of years after the completion of the first 5-year review in 1996. They will include not only the changes made in the first 5-year review but any annual changes made in the subsequent couple of years. The 2006 RVUs represent changes made in both the second and third 5-year reviews as well as any annual updates. There were 386 MPCs with positive values in 1992, 399 in 1999, and 386 again in 2006. There were 361 MPCs with positive values in both 1992 and 2006, the period for which we calculate most of the changes in work effort.

We show how the MPC links have changed in a few ways. First, we group MPCs into the broad specialty groups found in the CPT manual and calculate percent changes between 1992 and 2006. Large differences in work RVUs across specialties should reflect the drift in relative work effort that has occurred over the first 15 years of the MFS. Then we focus on the MPCs that have experienced the greatest increases and decreases in work effort over the 15 years. Finally, we show how the top 15 MPCs in terms of work effort in 1992 have changed over the period relative to each other and to the numeraire code 99213, an intermediate office visit.

6.3.3 MPC Trends in Work and Total RVUs: Broad Specialties

Table 6-3 presents changes in work and total RVUs for MPCs grouped into the major specialties according to the CPT manual. There were 361 MPC codes that had physician work RVUs in both 1992 and again in 2006 (see ***Appendix Table 6A*** for RVUs for all of the MPCs). Because final payment to physicians, as well as next year's conversion factor, depend upon practice expense and malpractice RVUs, Table 6-3 also shows changes in Total RVUs.

Digestive codes form the largest group with 53 different MPCs while Auditory has only 1 code and endocrine services only 2 codes. The unweighted change across the 16 groups was 13.1% over 15 years. This rises to 20% when codes within specialties are weighted by their 1992 RVU levels. The discrepancy between the unweighted and weighted percent changes reflects the bias in updating towards higher or lower valued codes.

Respiratory MPCs as a group experienced the greatest weighted increase in work RVUs (37%) followed by Cardiovascular and Digestive at about 35%. Urinary and Nervous System codes, however, showed the strongest bias in MPC updating towards the higher valued codes, as reflected in the difference between weighted and unweighted growth. A few specialty groups

such as Auditory, Radiology, and Medicine, show almost no net change in their MPC RVUs over the 15-year period.

Table 6-3
Percent Change in MPC RVUs by CPT Specialty, 1992 to 2006

Specialty	Number of Codes[a]	MD RVUs % Change		Total RVUs % Change	
		Unweighted	Weighted[b]	Unweighted	Weighted[b]
Respiratory	14	26.9	37.0	-8.0	2.1
Cardiovascular	35	27.5	35.4	-10.8	-9.1
Digestive	53	22.1	35.2	3.5	8.5
Female Genital & Maternity	14	30.7	30.5	2.5	2.5
E&M Visits	31	29.4	30.2	8.6	12.6
Nervous System	24	17.4	28.1	-10.4	-6.8
Integumentary	34	9.8	21.7	5.7	3.9
Musculoskeletal	29	9.8	10.2	1.2	-5.3
Urinary	18	1.2	9.1	-16.2	-11.7
Eye	9	9.3	9.1	-32.0	-32.8
Endocrine	2	11.0	8.7	-12.4	-13.1
Male Genital	11	9.0	8.5	1.8	-7.1
Pathology/Lab	10	1.7	5.3	-38.6	-34.8
Medicine	40	2.2	1.8	-47.2	-65.6
Radiology	36	1.5	0.7	-73.3	-76.5
Auditory	1	0.6	0.6	-21.9	-21.9
Total or Average	**361**	**13.1**	**20.0**	**-15.5**	**-15.4**

NOTE:

[a] Includes only codes with RVUs in 1992 and 2006.

[b] Weighted = percent changes for codes within a group weighted by each code's work RVUs.

SOURCE: 1992 and 2006 Federal Registers.

E&M visits appear as a separate category in the CPT code manual because all specialties use them to bill Medicare. They are of interest because they are thought to capture more primary care services, although more E&M codes refer to hospital and consult visits than office visits. Because E&M codes are commonly used, practically all of them (31 with both years of data) are included in the MPC list. E&M MPCs as a group have experienced a 30% increase in work RVUs since 1992, often at the insistence of CMS staff. In the first 5-year review, the RUC recommended increases in 39 of the 98 E&M codes. CMS staff rejected the RUC's recommendations as being inconsistent with no compelling reason for change. CMS' internal RVU workgroup and staff then raised the work RVUs for the majority of services; thereby moving the work intensity of visits closer to procedural services (McCall *et al.*, 1999). In the recently completed third 5-year review, the RUC formed a large consortium of specialties and

submitted a set of large increases in E&M work RVUs (see Section 1.2.4 for details). CMS agreed with these increases which was consistent with the agency's desire to better reward cognitive, time-consuming, services. Increasing E&M MPCs, however, has not been particularly biased towards primary care. The lowest three new office visit MPCs have had their work RVUs increased about 12% over 15 years, the lowest established office visit (99211) has actually had its RVUs decreased while the next lowest established office visit has been increased 12%. However, the higher paying new and established visit codes have been increased about 28% to 50%. By contrast, the hospital visit MPC codes have been increased 40-50% on average and the higher paying consult codes by 20-30%. What has offset these update biases is the 56% increase in the most common of all E&M billed codes, 99213, an intermediate office visit. How this particular code was updated in the 5-year review accentuates the uneven nature of the review process. The special RUC panel first agreed that 99213 involved more work than a simpler visit with a new patient (99202). Then, based on new survey data showing higher work than 99202, coupled with more diagnoses on 99213 claims, it slightly increased the work effort of 99213 above 99202 (0.92 versus 0.88). Interestingly, when Harvard completed its rigorous evaluation of the E&M codes in 1992, it found that a 99202 visit involved one-third more work than an intermediate office visit with an established patient. It is not clear what has happened with patients seen in these two categories that has caused such a change in relative work effort.

6.3.4 MPC Trends in Work RVUs: Individual Codes

Table 6-4 shows the ten MPCs with the greatest increase in work RVUs since the beginning of the MFS program. Code 34201, Arterial Embolectomy, has experienced the greatest increase (123%), and four MPCs have had their work RVUs more than doubled. For comparison purposes, an intermediate office visit (99213) had a 59% increase in its work RVUs between 1992 and 2006. MPC 47100, Liver biopsy, has had its work effort reduced the most since 1992 (-75%) and four other codes have experienced more than 40% decreases. The relative work effort involved in MPC 34201 compared with 47100 in 1992 was 1.19. By 2006, MPC 34201's work effort was now calibrated at 10.7 times that of 47100.

Table 6-4
Top 10 & 5 MPCs with Greatest Increases or Decreases in Work RVUs, 1992 to 2006

		Work RVUs		
Code	Description	1992	2006	%Change
Increases				
34201	Arterial Embolectomy, aortoiliac artery, leg	8.24	18.40	123
58100	Cervical biopsy, w/o dilation	0.73	1.53	110
43820	Gastrojejunostomy, w/o vagotomy	10.69	22.34	109
76091	Mammogram, both breasts	0.42	0.87	107
31600	Tracheostomy, planned	3.71	7.17	93
44130	Anastomosis of intestine	11.36	21.92	93
58720	Removal of Ovary/tubes,	6.35	12.04	90
32500	Removal of Lung, wedge resection	13.42	24.42	82
49002	Reopening of Abdomen	9.63	17.51	82
61526	Removal of Brain Lesion	30.44	53.84	77
Decreases				
50392	Insert Kidney drain	5.72	3.37	-41
50393	Insert Ureteral tube	7.05	4.15	-41
51050	Removal of Bladder stone	14.69	7.83	-47
45300	Protosigmoidoscopy, diagnostic	0.72	0.38	-47
47100	Wedge biopsy of Liver	6.92	1.72	-75

Table 6-5 shows what has happened to the ranking of the top 15 MPCs with respect to work effort between 1992 and 2006. The work RVUs of each code have been divided, or normalized, to the existing work effort of an intermediate office visit. For example, MPC 61520 (Craniectomy, excision of tumor), the top rated MPC in 1992, was worth 66.6 times the effort involved in an intermediate office visit at the time. By 2006, MPC 61520 had slipped to 2nd in the rankings. Its 2006 value of 61.8 reflects a lower rate of increase in work RVUs over the period relative to an intermediate office visit (99213). MPC 47130, Resection of liver, had (slightly) overtaken 61520 as the highest rated MPC in 2006 due to a 76% increase in its work RVUs. Today, the MFS regards the two MPCs as essentially equal work, but in 1992, 61520 was thought to have involved 22% more work.

A few MPCs have experienced substantial increases in their work effort relative to other top-rated codes, including 47130, 61526, 19364, and 33426 (that rose from 19th to 11th in the rankings). MPC 61518, Craniectomy, excision of tumor, and 43312, Throat repair, experienced the largest declines in their relative ranking due to modest increases in work RVUs.

To cite one example of the implications flowing from Table 6-5, MPC 61518 was estimated to require 2% more work effort than 47130 in 1992. By 2006, 61518 was estimated to require 30% less work than 47130. Whether specialists performing these two procedures would agree on such a large change in relative work effort is unknown because the whole list of MPCs has not been revised using multi-specialty panels. In the meantime, specialists are using the two MPCs in their family of codes to rate new and revised codes. If a 30% difference is inaccurate, then calibration of all new and revised codes in the two families will likely perpetuate and reinforce the error.

Table 6-5
Top 15 MPCs in 2006 Compared with Ranking in 1992

Rank 1992	Code	Description	Work RVUs v. Visit Code 99213 1992	2006	Rank Code 2006
1	61520	Craniectomy, excision of angle tumor	66.6	62.0	47130
2	33870	Thoracic Aortic Aneurysm w/ bypass	65.5	61.8	61520
3	51596	Excision of Bladder, complete	63.0	58.5	61526
4	61700	Intracranial Aneurysm, simple	60.5	57.1	48150
5	61518	Craniectomy, excision of tumor	56.0	54.8	61700
6	47130	Resection of Liver, total lobectomy	54.8	54.1	33430
7	48150	Excision of Pancreas w/ duodenectomy	52.5	49.9	33870
8	61526	Bone Flap craniotomy	51.6	47.7	51596
9	33430	Mitral Valve Replacement w/ bypass	51.1	46.0	19364
10	35082	Ruptured Abdominal aorta aneurysm	50.0	45.5	35082
11	33405	Aortic Valve Replacement w/ bypass	49.4	44.9	33426
12	33513	CABG, 4 venous grafts	49.1	43.8	50360
13	35091	Abdominal aorta aneurysm w/ vessels	48.8	43.4	33405
14	19364	Breast Reconstruction w/ flap	47.9	43.1	33513
15	43312	Throat Repair w/ repair of fistula	47.3	43.1	61518
	⋮				
16	50360	Renal Transplantation	47.0	38.4	35091
19	33426	Mitral Valve Replacement w/ bypass+ring	45.3	31.8	43312

NOTE Work RVUs v. 99213= ratio of code's work RVUs in year to RVUs for 99213, intermediate office visit.

SOURCE: 1992 and 2006 Federal Registers.

SECTION 7
USE & MODIFICATIONS OF THE MFS WORK RVUS BY PRIVATE INSURERS

7.1 Study Objectives

The Centers for Medicare & Medicaid Services (CMS), with considerable technical support from the American Medical Association, has recently completed its third 5-year review of the relative value units (RVUs) for physician work. The resulting RVU updates in fees are heavily biased towards increased work and payment, as they were in the first two 5-year reviews. Private insurers around the country also must determine the fees they will pay physicians. Any modifications they may make for higher productivity and efficiency could be used by CMS in future RVU updates. To our knowledge, CMS has not surveyed private insurers on how they take productivity gains into account, if at all.

This section summarizes the findings from a qualitative set of interviews that we conducted with key decision-makers in a small sample of private health insurance and managed care organizations. The objectives of this study were:

- To document the perceptions of managers and Medical Directors regarding the extent and types of misvalued services
- To determine how much private payers relied on the Medicare Fee Schedule
- To describe how private payers implement the MFS to control physician outlays
- To identify organizations that had modified their relative value scales in recognition of productivity gains in providing certain services
- To identify organizations that have collected data on physician work effort by service that could indicate which services have experienced the greatest efficiency gains.

The remainder of this section is in five subsections beginning with more background on why we thought private organizations could help identify over-valued services. We then describe our interview process followed by a set of findings in Section 7.4 grouped into five areas:

- Interviewee perceptions of over/undervalued services
- Use of the MFS by private insurers
- More general strategies that private organizations use to control physician outlays
- Private sector studies of overvalued services and productivity gains
- The interest and support of private organizations in CMS' study of efficiency gains.

We then summarize our key findings across these areas and conclude with our own interpretation of the barriers and disincentives private organizations face in making service-specific changes in RVUs and payments.

7.2 Background

This project was inspired in part by our knowledge of efforts in several organizations to modify the specialty distribution of payments from using Medicare's RVUs to better conform to actual levels of physician work, thereby promoting greater equity in compensation for work effort, and better serving the broader goals of the group. Multi-specialty physician organizations, such as academic departments of medicine, often subsidize the salaries of less-well remunerated subspecialty departments whose work is primarily performing office and hospital E/M services (e.g. endocrinology, infectious disease) by taxing the clinical incomes of departments that perform services that are more generously rewarded (e.g. cardiology/invasive and non-invasive services, gastroenterology/endoscopies). The group's clinical income is based on the existing Medicare and private payer fee schedules and then redistributed to some extent using the group's own relative value formulas. In addition, one of us (Braun) had consulted with the leaders of two cardiology groups that had devised modified relative value scales just for cardiology services. The work RVUs for invasive and non-invasive services (angiography, angioplasty, echocardiography, nuclear cardiology, electrocardiography) were reduced while significantly increasing those for evaluation and management services. Finally, the former medical director of one managed care organization that we were familiar with, established a process to identify overvalued services with the intention of reducing their RVUs in the plan's fee schedule.

Encouraged by these examples of Medicare RVU modifications based on more accurate perceptions of work effort, we conducted a non-random search of both health provider groups as well as private insurers that might be (1) actively engaged in programs of changing RVUs to more closely conform to physicians' work, or that were (2) collecting data on resource costs (including time) that could eventually be used to develop more accurate relative values of work.

7.3 Sample & Interview Process

7.3.1 Sample

For this exploratory case-study, we sent letters to the senior management of 7 major private health insurers (see ***Appendix 7A*** for sample letter) describing our interest in identifying physicians' services that had undergone increased productivity. The insurers were selected based on personal contacts and recommendations from interviewees. The insurers and health care organizations included (with number of persons interviewed in parentheses):

- Aetna Insurance Company, Hartford (3)
- Tufts Health Plan, Boston (3)
- HealthPartners, Minneapolis (1)
- Kaiser Permanente, Oakland (1)

- Independent Health Plan, Buffalo, NY (2)
- Virginia Mason Medical Center (VMMC), Seattle (1)
- Blue Cross Blue Shield of MA, Boston (4).

We also spoke with the former Medical Director of a major Boston managed care plan who suggested other individuals and healthcare organizations that he believed were modifying (or were interested in modifying) physician payment arrangements based on scales that follow physician work more faithfully than the MFS.

7.3.2 Interview Process

Dr. Braun conducted all interviews, speaking with 16 individuals who held positions including

- Chief Executive Officer
- Head of Medical Policy & Program & Claims Support
- Head, Network Operations
- Chief Medical Officer
- Director of New Technology Assessment
- Director of Reimbursement, Fee Schedules, & RVUs.

We sent these individuals letters (and/or e-mail attachments) describing the objectives of the research in more detail, its sponsorship by ASPE, and our interest in identifying physicians' services that had benefited from increased productivity/efficiency as a result of technology substitution, personnel substitution, learning curve effects and re-engineering. We also enclosed a transcript of the portion of the January 10th, 2006 meeting of MedPAC concerned with misvalued services in the MFS and a copy of the letter from the Chairman of MedPAC to CMS dated August 17,2006, concerning the importance and how best to identify possibly overvalued services.

The interviews took place in scheduled telephone conferences lasting 30 to 90 minutes. We followed a structured process (see ***Appendix 7B*** for interview guideline), modifying the interview as differences in organizational policies, roles of interviewees, and the course of the conversation dictated. Major domains covered in the interviews were:

1. Perceptions of over/undervalued services
2. Use and modifications of the Medicare Fee Schedule for setting physician fees
3. Concerns about payment biases for families of codes

4. Studies of overpriced services and productivity gains

5. Identification of private sector organizations interested in studying increased productivity/efficiencies in providing care.

7.4 Findings

7.4.1 Perceptions of Misvalued/Overvalued and Undervalued Services

There was a general recognition by the interviewees that the trends in technology substitution, re-engineering, the migration of surgical procedures to ambulatory surgical centers, and learning curve effects had led to efficiencies and reduced physician work effort without appropriate reductions in fees. When asked for examples of efficiencies brought about by new technology and other trends, respondents pointed to such areas as

- Imaging (radiology, computed tomography and MRI)
- Personnel substitution in surgical teams
- Physician learning leading to lower time requirements for GI endoscopy, computerized diagnostic testing
- The shifting of many surgical procedures to surgicenters
- Arthroscopic shoulder and knee procedures
- Office-based urologic procedures, and
- Vein ablation procedures using radiofrequency methods.

One medical director, a general surgeon, gave as an example of the rapid learning process for new procedures that the time it took him to perform laparoscopic cholecystectomy declined with experience from four to one hour.[19]

7.4.2 Use and Modifications to the Medicare Fee Schedule (MFS)

With the exception of Kaiser, which functions as a staff model care organization with salaried physicians, all of the organizations covered in these interviews employ CPT codes to denote physician services and MFS RVUs as the basis of payment for physician work, practice expenses, and malpractice costs. Plans purchase their payment software primarily from

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[19] Distortions in payment for some services may affect not only physician payment (including not only physician work and practice expense) but also facility fees. One interviewee observed that as certain services (e.g., imaging) are moved from hospitals to free-standing facilities, hospital budgets (which often use income from certain ancillary services to subsidize the basic bed rate and other costs) may become seriously stressed. This illustrates how, in another arena, distorted charges are used by an integrated payer, such as a hospital, to subsidize less adequately paid services; the distortion comes to light when other actors (e.g., medical entrepreneurs) learn how to move the more lucrative operations from hospitals to non-hospital sites.

McKesson (80% of market) or Ingenix. The software relies on Medicare' RVUs and allegedly makes more than a million payment edits for eligibility, completeness of the claim, bundling of codes, and downcoding of CPT code for insufficient justification of a more complex service. Many of these payment policies differ from those followed by Medicare, as enunciated in CMS's National Correct Coding Initiative (NCCI).[20]

Some executives felt that Medicare's fee schedule provides authority to their passive approach to fee-setting while the use of commercial software is convenient and cost-effective in handling the myriad payment edits required. To the extent that plans accept physician payment software purchased from either McKesson or Ingenix, less pricing competition occurs among plans, at least within a region.

None of the organizations that we surveyed systematically modify the individual service RVUs for productivity or other changes in physician practice. The main way they differ from Medicare is in using higher monetary conversion factors. Respondents admitted that they rely on a "squeaky wheel" strategy to physician complaints by modifying one or more conversion factors or occasionally adjusting fees for some families of codes. The executives told us that when they do make modifications in RVUs for specific services, it is always in the *upward* direction (e.g. obstetrical services or anesthesiology services). These adjustments are generally described as "responses to market forces." It was not clear how these pressures were manifested, but the impression was that the payers did not have sufficient market power to adhere to Medicare's conversion factor or even to the plan's own established (higher) conversion factor for that matter.

7.4.3 General Strategies that Private Insurers Use to Control Physician Outlays

While insurers use Medicare's relative values essentially unchanged, these organizations are able to address the cost of particular services through their payment policies. They are enabled in this strategy by using commercial claims adjudication software, resulting in

- Denial/suspension of payment
- Downcoding to lower RVU codes
- Bundling of separate codes to a single fee
- Precertification of costly services
- Profiling of physicians with high rates of complex E&M and procedure codes.

Denial, suspension, and downcoding strategies are justified by payers employing only the ICD coded diagnostic information on the claim or citing lack of eligibility. The commercial software also bundles related services into a (lower) single global payment for the visit or

[20] Personal communication, Peter Braun, M.D. This situation may be in flux, since almost all the private health insurers and managed care organizations have recently agreed to settlements in a class action suit brought by physicians and state medical societies over these payment policies (U.S. District Court, Miami Division. 00-1334-MD-Moreno).

procedure more often than does Medicare. We asked, as a marker of services that a plan might consider overvalued (or overused), whether the plan pays special attention to particular physicians' services in its policies. One insurer provided us with a list of services that require precertification (***Appendix 7C***). Most plans also follow a strategy of profiling physician use of certain codes (e.g. high level evaluation E/M codes), followed by actions directed at particular physicians identified as high volume outliers. When a group of providers protest a new payment policy, for example, bundling and diminished total payment of previously separate codes, the insurer can override the new rule by customizing the commercial software.

7.4.4 Studies of Overvalued Services by Health Insurers and MCOs

As mentioned above, none of the 7 private health insurance or managed care organizations we surveyed conducted any systematic studies of overpriced procedures or those undergoing significant productivity gains. In fact, one organization once had a process for identifying overvalued services to justify lower service RVUs and payments. However, the organization was no longer doing so and had dissolved the physician advisory committee assembled for the task because the time and effort was not deemed cost effective. This was true in spite of the rather lengthy list of services that the Medical Director suspected were overvalued in terms of work or practice expense (see list in Section 4.1).

A limitation that was frequently cited by respondents was a lack of staff resources available to study potentially overpriced procedures. Market pressures from specialists also may have played a part in not making the sizable investment required to readjust work RVUs.

7.4.5 Private Payer Interest in Studying Efficiency Gains in Physician Practices

When asked whether their organization would be interested in conducting or supporting research on physician work effort and other practice costs of high-paying CPT codes (e.g., complex office visits), the executives said that, while they might be interested, they did not have the resources to do such work.

During the course of our interviews, we became aware of one integrated health care provider, the Virginia Mason Medical Center in Seattle (VMMC), that carefully studies productivity and efficiency at the level of individual physician services. Among VMMC's objectives are improving the quality of care, bringing a more efficient and appropriate mix of health care resources to bear on its delivery, and providing more equitable payment of physicians in different specialties.[21] While the immediate goals of VMMC's program of improving quality of care and reducing waste differ from ours, the data collected by the program may be particularly relevant to research on the resource costs of physician services. VMMC bills for its physicians' services using CPT codes, but physician compensation comes in the form of salaries that are based on "internal and market consistency, aligned with organizational goals." A large part of VMMC's success stems from its ability to cross subsidize from well-compensated, high

[21] A 2006 case study at Harvard Business School describes important role that adoption of the Toyota Production System (PTS) played in this process (Bohmer RMJ and Ferlins DM. Virginia Mason Medical Center, Harvard Business School Case Study N9-606-044, January 11, 2006).

RVU, services to less-well compensated, RVU-undervalued, services recognized by specialists as essential to the patients and to the organization.

The CEO of VMMC, who also originated that organization's efficiency program, stated that VMMC collects detailed information on the time spent by various providers as well as the support costs associated with providing CPT-coded services at an individual patient level. He also indicated that these data might be made available to outside researchers under appropriate conditions.

7.5 Summary of Key Findings

Private insurer executives and physicians we interviewed all believed that trends in personnel and technology substitution, rapid learning of procedures, and the re-engineering of services had reduced physician work for many types of diagnostic and surgical procedures. They also did not believe that on-going adjustments in the MFS work RVUs by Medicare adequately reflect these efficiency gains.

All of the insurer and provider organizations we surveyed used CPT codes for billing purposes. They also implicitly relied heavily on the relative values published by CMS annually because they purchase a commercial software package that is based on the MFS fee schedule—at least for physician work RVUs. This software package is so prevalent that we can generalize private payer reliance on Medicare RVUs to the majority of payers nationwide. Private health insurance and managed care organizations can be characterized as "followers" of Medicare policy when it comes to relative values rather than developers of fee schedules, as they had been under the "usual, customary and reasonable (UCR)" system.

Despite their belief that the Medicare RVUs currently do not adequately incorporate productivity gains, none of the organizations we surveyed systematically modified the RVUs to reflect such gains. The most frequently cited reason for not modifying Medicare's published RVUs was a lack of staff resources necessary to collect and thoroughly analyze data on changes in physician work for hundreds of services at issue. Market pressures from specialists also were said to have played a part in not making the sizable investment required to readjust work RVUs. Private payers were concerned over paying competitive fees. Instead of actively changing work RVUs, most organizations applied a "squeaky wheel" strategy by modifying their conversion factors, either for all services or for certain families of codes to satisfy a particular specialty.

Lacking the resources to "fix" Medicare's work RVUs where needed, private insurers reportedly rely on denial, downcoding, bundling, precertification, and physician profiling to control outlays on physician services. Denial, downcoding, and bundling are embedded in the commercial software they purchase, although payers can alter some of the rules by customizing the software. Recalibrating work RVUs for individual services (e.g., complex consultations, CT imaging) would require substantial new expenditures on research in addition to the cost of the commercial software. Precertification lists of costly services and profiling physician claims involve far less of an investment than RVU recalibration. Consequently, with the exception of VMMC and possibly a few other large, staff model HMOs, we are unaware of any scientific resource within the private insurance/managed care sector that would support independent, critical review of AMA/RUC recommendations for updates in RVUs.

7.6 RTI Comments on Private Insurer Responses

The responses of private insurance executives raise a few interesting questions for policy makers.

- *First, why do most payers use the Medicare Fee Schedule RVUs and many of its payment policies?*

The answer seems to be the imprimatur associated with the MFS. After all, extensive scientific research went into the calibration of the RVUs. It was developed by academic experts using numerous surveys of practicing physicians in many fields. The fact that the McKesson and Ingenix corporations have produced software packages based on the Medicare relative value scale but tailored to a plan's own payment rules only reinforces the decision to accept the work RVUs embedded in the program.

- *Second, if payers believe fairly strongly that technical and productivity trends should have reduced physician work RVUs for many services, why haven't they fixed misvalued RVUs?*

Part of the answer lies in the fact that most payers are insurance companies with a financial and not medical management orientation. Their success is dependent on accurate actuarial analyses and managing the financial risk across subscribers. Plans also rely heavily on the financial returns they make from investing premiums in bonds, stocks, real estate, and the like. Their rate of return to more favorable patient selection and prudent investing is likely much higher than in trying to recalibrate work RVUs for productivity gains.

The insurers also are aware of the costly resources and complex methods involved in actually correcting a few hundred overvalued services—resources and knowledge that many of them do not possess in-house. To properly adjust their total fee on each questionable service, they not only would have to conduct studies justifying lower work RVUs, but they would have to make the appropriate increases in practice expense RVUs as well. Even if they were successful in reducing RVUs and payments for some services, the rate of return per research dollar invested may be much lower than in other activities. For example, assume a plan has 25% of the local market and physician services are 25% of all outlays. Further assume that a 20% fee reduction could be justified based on productivity gains on certain codes that account for 15% of their physician outlays (and making no budget neutrality adjustments). The total dollar savings would be 0.03, or 3% of the plan's total outlays in the market. In a large plan with $250 million in physician outlays, savings could be $7.5 million annually, which may be worth the investment. However, the vast majority of markets and plans are much smaller.

It is also questionable how successful plans would be in enforcing the lower work RVUs and payments for high-price services. Local availability of specialists and the number of competing plans trump any potential savings from basing allowable fees on lower, but more scientifically correct, RVUs. Their "squeaky wheel" strategy to adjusting Medicare's resource-based fees imitates the normal trial-and-error pricing fluctuations that take place in nearly all competitive private markets. Bundling services, downcoding for incomplete justification of

needed services, and identifying high-volume physicians are considered far less costly alternatives per dollar saved.

- *Third, why doesn't McKesson or Ingenix adjust the published Medicare RVUs for productivity gains which could then be passed through to private insurers?*

If a commercial firm conducted its own research and adjusted RVUs for some suspect services, the results would lack the imprimatur inherent in the national Medicare Fee Schedule. This could discredit the underlying RVU structure of the firm's software in the eyes of providers and depress sales.

- *Fourth, how would private payers respond if CMS made major adjustments in the work RVUs associated with misvalued services based on analyses of physician productivity gains?*

A major lesson drawn from our interviews speaks to the advantages, indeed, the necessity, of having Medicare "go first" in revising work RVUs. Only Medicare can provide the nationally recognized authority behind any changes in work RVUs. Medicare also is the only group capable of making the necessary adjustments to practice expenses associated with lower work RVUs.

Were Medicare to reduce the RVUs for selected procedures nationally, it is likely that plans would quickly follow using McKesson or Ingenix software updates for the new RVUs. Private payer conversion factors would likely remain higher than Medicare's, but private payments should fall using lower RVUs for overpriced services. Payers likely would respond to physician complaints by citing their continued conformance with nationally published work and practice expense RVUs.

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